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United States  
Department of  
Agriculture

Forest Service

National  
Forest  
System

January 1992



# Final Environmental Impact Statement

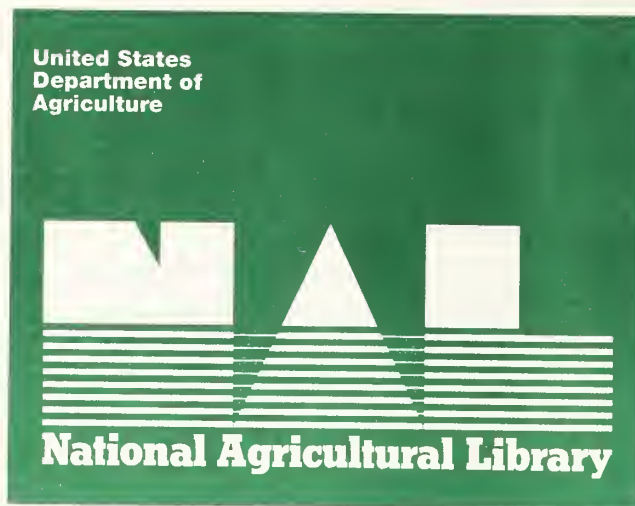
## on Management for the Northern Spotted Owl in the National Forests

### Volume 2, Appendices



# A

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FEIS	Final Environmental Impact Statement
FORPLAN	Forest Planning Model
FSEIS	Final Supplement to the Environmental Impact Statement for the Pacific Northwest Region (Spotted Owl Guidelines, 1988)
FSH	Forest Service Handbook
FSM	Forest Service Manual
FWS	U.S. Fish and Wildlife Service (USDI)
GIS	Geographic Information System
HCA	Habitat Conservation Area
ISC	Interagency Scientific Committee
IMPLAN	Forest Service Input-Output Economic Model
KV	Knutson - Vandenberg Act of 1924
MBF	Thousand Board Feet
MCF	Thousand Cubic Feet
MMBF	Million Board Feet
MMCF	Million Cubic Feet
MPA	Multiple-Pair Area
NEPA	National Environmental Policy Act of 1969
NFMA	National Forest Management Act of 1976
NPS	National Park Service (USDI)
NRF	Nesting, Roosting, and Foraging (Habitat)
PNW	Pacific Northwest Forest and Range Research Station (USDA)
PSW	Pacific Southwest Forest and Range Research Station (USDA)
R-5	Forest Service Pacific Southwest Region (CA)
R-6	Forest Service Pacific Northwest Region (WA and OR)
RNA	Research Natural Area
ROD	Record of Decision
SAS	Seattle Audubon Society
SOHA	Spotted Owl Habitat Area
TSPIRS	Timber Sale Program Information Reporting System
USDA	United States Department of Agriculture
USDI	United States Department of the Interior

In this environmental impact statement, any reference to "owl" or "spotted owl" refers to the northern spotted owl (*Strix occidentalis caurina*) unless specifically identified as another species or subspecies.



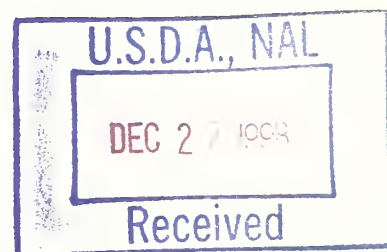
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# Appendices to the Final Environmental Impact Statement

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## on Management for the Northern Spotted Owl in the National Forests

States of Washington, Oregon,  
and California



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# Table of Contents

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## Volume 2

Appendix A - Public Involvement . . . . .	A-1
Appendix B - Analytical Models . . . . .	B-1
Appendix C - Management of Other Lands . . . . .	C-1
Appendix D - Annotated Bibliography . . . . .	D-1
Appendix E - Related Activities . . . . .	E-1
Appendix F - Fire and Fuels Management . . . . .	F-1
Appendix G - Insects and Diseases . . . . .	G-1
Appendix H - Land Adjustment . . . . .	H-1
Appendix I - Pacific Yew . . . . .	I-1
Appendix J - Monitoring Plan . . . . .	J-1
Appendix K - Multi-Resource Strategy . . . . .	K-1
Appendix L - Response to Public Comments . . . . .	L-1
Introduction . . . . .	L-1
A. Comments and Responses . . . . .	L-A-1
The EIS Process . . . . .	L-A-1
Viability and Management of Other Lands . . . . .	L-A-1
Reexamine Decisions Made in Forest Plans . . . . .	L-A-2
Management of Other Resources . . . . .	L-A-3
Underlying Purpose and Need . . . . .	L-A-5
Disclosure of Risk and Uncertainty . . . . .	L-A-5
Time and Innovative Strategies Needed . . . . .	L-A-7
Interdisciplinary Process . . . . .	L-A-8
Critical Habitat . . . . .	L-A-8
Wording, Editing, and References . . . . .	L-A-8
Diversity of Plant and Animal Communities . . . . .	L-A-9
Supplement to the DEIS . . . . .	L-A-9
Shelton Cooperative Sustained Yield Unit . . . . .	L-A-11
Habitat Conservation Areas . . . . .	L-A-11

Alternatives . . . . .	L-A-12
Major Additional, or Modified, Alternatives . . . . .	L-A-12
Combination of Alternatives . . . . .	L-A-12
Alternatives with Changed Standards and Guidelines . . . . .	L-A-12
Alternatives Outside Forest Service Authority . . . . .	L-A-13
A Full Range of Alternatives . . . . .	L-A-14
An "Environmental Alternative" . . . . .	L-A-14
Modified Alternative D . . . . .	L-A-14
Sub-Region Management Alternatives . . . . .	L-A-15
Separate Alternative for California . . . . .	L-A-15
Scientific Panel and Ecosystem Approach Alternatives . . . . .	L-A-16
Specific Boundary and Unit Change Alternatives . . . . .	L-A-17
Alternatives for Lands Off the National Forests . . . . .	L-A-17
Alternative C Comments . . . . .	L-A-17
The "No-Action" Alternative . . . . .	L-A-18
Multi-Resource Strategy Alternative . . . . .	L-A-18
Incomplete Alternatives . . . . .	L-A-19
Implementation . . . . .	L-A-20
Incorporation of Research . . . . .	L-A-20
Amendment of Standards and Guidelines . . . . .	L-A-20
Area Boundries . . . . .	L-A-21
Technical Review Team . . . . .	L-A-21
Standards and Guidelines for Activites . . . . .	L-A-21
Implementation in California . . . . .	L-A-22
The Northern Spotted Owl . . . . .	L-A-23
Scientific Credibility of the ISC Report . . . . .	L-A-23
Endangered Species Act and Consultation . . . . .	L-A-24
Range of the Northern Spotted Owl . . . . .	L-A-25
Incorporation of Current Literature, Studies, and Surveys: Habitat . . . . .	L-A-26
Incorporation of Current Literature, Studies, and Surveys:	
Spotted Owl Biology . . . . .	L-A-27
Nesting, Roosting, and Foraging Habitat . . . . .	L-A-27
Owls in Managed Forests . . . . .	L-A-29
Habitat on State and Private Lands . . . . .	L-A-30
Known Number of Northern Spotted Owls . . . . .	L-A-31
Subspecies Status . . . . .	L-A-31
Spotted Owl Biology . . . . .	L-A-31
Artificial Protection Measures . . . . .	L-A-32
Adequacy of Viability Analysis . . . . .	L-A-33
Minimum Viability . . . . .	L-A-34
Viability Rating . . . . .	L-A-35
Habitat Conservation Areas . . . . .	L-A-38
The 50-11-40 Rule . . . . .	L-A-40
Development of Silvicultural Method for Harvest Within HCAs . . . . .	L-A-41
Comments on Alternative C . . . . .	L-A-41
Monitoring Spotted Owl Populations . . . . .	L-A-42



Timber Management . . . . .	L-A-43
Timber Management - General . . . . .	L-A-43
Research Related to Timber Management . . . . .	L-A-46
Timber Management Opportunities and Alternatives . . . . .	L-A-47
Forest Health . . . . .	L-A-49
The 50-11-40 Rule . . . . .	L-A-49
Mitigation Measure and Forest Management Direction . . . . .	L-A-50
Timber Productivity and Allowable Sale Quantity . . . . .	L-A-52
 Pacific Yew ( <i>Taxus Brevifolia</i> ) . . . . .	L-A-54
Pacific Yew - General . . . . .	L-A-54
Taxol Sources . . . . .	L-A-54
Yew Availability . . . . .	L-A-55
 Insects and Diseases . . . . .	L-A-56
 Port-Orford-Cedar . . . . .	L-A-58
 Fire and Fuels . . . . .	L-A-59
Fire Management - General . . . . .	L-A-59
Catastrophic Fire Potential . . . . .	L-A-59
Fuels . . . . .	L-A-60
Fire Prevention and Suppression . . . . .	L-A-60
 Old Growth . . . . .	L-A-61
 Wildlife and Threatened and Endangered Species . . . . .	L-A-63
Marble Murrelets . . . . .	L-A-63
Big Game . . . . .	L-A-63
Other Wildlife . . . . .	L-A-63
 Water Quality and Fish Habitat . . . . .	L-A-65
Sensitive Fish Stock . . . . .	L-A-65
Water Quality . . . . .	L-A-66
Watershed Management . . . . .	L-A-66
 Soils . . . . .	L-A-67
Soil Erosion . . . . .	L-A-67
Soils and Habitat Management . . . . .	L-A-67
 Land Uses and Permits . . . . .	L-A-68
 Minerals . . . . .	L-A-69
Mining - General . . . . .	L-A-69
Open Pit Mining . . . . .	L-A-69
Access . . . . .	L-A-70

Recreation . . . . .	L-A-71
Off-Highway Vehicles . . . . .	L-A-71
Ski Areas . . . . .	L-A-71
Primitive Non-Motorized Recreational Opportunities . . . . .	L-A-71

Transportation . . . . .	L-A-72
Road Closures . . . . .	L-A-72
Road Costs . . . . .	L-A-72
Roads and Multiple-Use Management . . . . .	L-A-72

Economics . . . . .	L-A-74
Technological Advances in the Lumber Industry . . . . .	L-A-74
Time Periods Chosen to Display Economic Effects . . . . .	L-A-74
Employment and Income Effects from Other than National Forest Timber Harvests . . . . .	L-A-74
Employment Multipliers . . . . .	L-A-76
Distribution of Effects . . . . .	L-A-77
Changes in Timber Employment . . . . .	L-A-78
Multi-Resource Strategy . . . . .	L-A-78
Timber Market Effects . . . . .	L-A-78
Social Cost of Unemployment . . . . .	L-A-82
Log Exports . . . . .	L-A-83
Economic Value of Non-Timber Resources . . . . .	L-A-84
Revenues/Returns to Counties . . . . .	L-A-85
Wood Product Prices . . . . .	L-A-86
Economic Efficiency Measures . . . . .	L-A-87
Economic Diversification . . . . .	L-A-87

Communities . . . . .	L-A-99
Social and Cultural Effects . . . . .	L-A-89
Civil Rights Impacts . . . . .	L-A-90

Comments and Concerns . . . . .	L-A-91
"Direct Quotes" . . . . .	L-A-91

B. Letters From Agencies . . . . .	L-B-1
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C. List of Respondents . . . . .	L-C-1
----------------------------------	-------

Appendix M - Biological Opinion . . . . .	M-1
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# A

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## Appendix A Public Involvement





# Appendix A

## Public Involvement

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### Introduction

On May 8, 1991, the Forest Service published its intent to prepare an environmental impact statement on management for the northern spotted owl in Washington, Oregon, and California (Federal Register 56: 21354-21355).

This action was taken in response to a court order from U.S. District Court Judge William Dwyer pertaining to the lawsuit *Seattle Audubon Society, et al. v. Evans, et al.* (*SAS v. Evans*). Judge Dwyer ordered the Forest Service to complete the environmental impact statement process and implement a decision by March 5, 1992.

### Prior to Publication of the Draft Environmental Impact Statement

The public was invited, through the Federal Register Notice, to submit comments on the scope of the analysis through June 7, 1991. Three letters of comment were received by June 7, and two additional letters were received in August.

Letters soliciting comments were mailed to the appellants and intervenors in the *SAS v. Evans* court case. One response was received.

In addition to soliciting public comments, the interdisciplinary team preparing this document used scoping information on this issue which had been generated through other sources. Those include:

- Final Supplement to the Environmental Impact Statement to the Regional Guides in 1988,
- Forest Plans on 17 National Forests, and
- Interagency Scientific Committee Report in 1990.

The scoping done in the preparation of these management planning efforts has been relied upon in the preparation of this environmental impact statement.

## *Appendix A*

### **After Publication of the Draft Environmental Impact Statement**

The Draft Environmental Impact Statement was published and distributed to the public beginning September 27, 1991.

Over 1,417 copies of the complete Draft Environmental Impact Statement including maps, and over 6000 copies of the shorter 27 page summary were mailed to interested publics.

Three months were allotted for receipt of public comments on the Draft. The comment deadline was December 27, 1991. In total 5,225 separate pieces of mail were received during the public comment period (see Appendix L).

During the public comment period, informational briefings were held in Washington D.C.; Olympia, WA; Salem, OR; and Sacramento, CA.

Three public hearings were held in the following locations to facilitate public comment:

- Olympia, WA - October 15, 1991
- Salem, OR - October 17, 1991
- Redding, CA - October 21, 1991

Over 1000 people attended these hearings, 145 of which presented oral testimony for the official record at the hearings. These comments were included in the comment analysis process addressed in Appendix L.

### **After Publication of the Final Environmental Impact Statement**

This Final Environmental Impact Statement was delivered to the Environmental Protection Agency on January 24, 1992, for inclusion in the January 31, 1992, Federal Register publication. The Final Environmental Impact Statement was mailed to commenting agencies and the public on January 24, 1992. See the Distribution List section in this document for specific information on the mailing process.

The Record of Decision will be signed by the Secretary of Agriculture no earlier than March 2, 1992. Written comments relative to the Final Environmental Impact Statement may be submitted in accordance with instructions listed in the Summary of this document.

# B

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## Appendix B

### Analytical Models





# Appendix B

## Analytical Models

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### Contents of this Appendix

This appendix is divided into six parts. Part one explains the methods used to compile base acreages and owl numbers for this analysis. The second part documents the analysis used to calculate allowable sale quantity (ASQ) figures for each alternative. The third part describes the IMPLAN model used to estimate employment and income figures. The fourth part describes the Timber Assessment Market Model (TAMM) used in analyzing the impacts on timber markets. The fifth part discusses modeling for habitat capability. And the sixth part describes spotted owl habitat calculations.

### Part 1: Data Compilation

The data necessary to prepare this environmental impact statement were obtained through the construction of a Geographic Information System (GIS) data base. This spatial data base contains 14 layers of information covering the 17 National Forests in Washington, Oregon, and California included in this analysis. Most of the coverages were provided by the Forests in GIS format.

This task was not completed in time to be used for the Draft Environmental Impact Statement. Data needed for analysis and modeling for the Draft were obtained from Forest specialists and Forest Plan documents.

The process of validation and correction of the GIS data for use with the Final Environment Impact Statement clarified and standardized coverage definitions in order to obtain consistency across Forest boundaries. Maps of the final GIS coverages, along with total acres, were reviewed and approved by Forest personnel. Corrections were made to the data base. Attributes in the coverages were recoded so that each Forest's coverages contained values compatible with those of other Forests.

The data base used for this environmental impact statement consists of coverages for each of the 17 National Forests included in this analysis containing:

- Administrative Boundary
- Congressionally Designated Reserved Areas
- Spotted Owl Habitat Areas (SOHAs)
- Habitat Conservation Areas (HCAs)
- Critical Habitat Units (CHUs) (August 13, 1991, release)
- Critical Habitat Units (CHUs) (Final rule)
- Northern Spotted Owl Locations
- Northern Spotted Owl Habitat (as defined by Forest personnel)
- Management Areas for the Multi-Resource Strategy (Alternative E)
- Lands Tentatively Suitable for Timber Management
- Lands Suitable for Timber Management
- Northern Spotted Owl Physiographic Provinces
- Northern Spotted Owl Range
- Areas of Concern for the Northern Spotted Owl

In order to get a more efficient data set for use in analysis, the interdisciplinary team sampled the GIS layers with a grid representing 40-acre cells and loaded the resulting file into tabular data bases. This sampled data base represented all of the GIS layers in a fashion that the interdisciplinary team could use for rapid analysis of queries that did not require spatial display.

## **Part 2: Analytic Model Used for Determining Harvest Volume**

In general, the determination of various Forests' annual harvest volumes was made based on existing Draft or Final Forest Plans. These volumes were figured by eliminating most management activities, such as timber harvest or facilities and road construction, from the designated areas managed primarily for spotted owl habitat. The same computer model that was used in developing each Forest Plan was used on most Forests to obtain an estimate of the new mix of resource allocations, outputs, and values based on this new allocation and all previous objectives and constraints.

Each National Forest included in this analysis has completed or is working on a Forest Land and Resource Management Plan, including an environmental impact statement, that sets management direction for all Forest resources. Forest planning is an extremely complex process. A substantial amount of information and interdependent decisions was considered before a management plan alternative was selected. The selected alternative was the one which best addressed the issues, concerns, and opportunities that were identified at the beginning of the planning process. Several interrelated computer models and analytical tools have been developed to help determine the decision space within which alternatives can be developed, and to evaluate their associated outputs and effects. These tools are also helpful in determining the most efficient means of meeting the goals and objectives of the alternatives.

The major forest planning model used by National Forests today is called FORPLAN: an acronym for FOREst PLANning model.

FORPLAN is a linear programming-based computer modeling system. It consists of three components:

- A matrix generator to translate the interdisciplinary team's input into the proper format for use by the linear programming component.
- A linear programming solution system (FMPS: Functional Mathematical Programming System).
- A report writer to translate the linear programming solution into useful information for decision making.

Linear programming is a mathematical modeling technique used to solve a series of simultaneous linear equations, such that one criterion is maximized or minimized, subject to meeting all specified constraints. Pertinent information about the Forest must be translated into linear equations in order to apply linear programming to the planning problem. This task was performed by the interdisciplinary team.

Each Forest's FORPLAN model was specifically designed to aid the interdisciplinary team in analyzing how the various alternatives addressed the identified issues, concerns, and opportunities.

Each Forest was divided into "analysis areas." These are tracts of land with relatively homogeneous responses to management activities in terms of the outputs and effects that are being analyzed in the FORPLAN model. These areas are non-contiguous. A given analysis area can consist of a number of tracts of land scattered across the Forest. Some difficulty can arise when modeling spatially-based parameters such as spotted owl habitat areas. These spatial areas are first 'defined' by allocating them to appropriate analysis areas. Resultant bias is minimized through calibration runs prior to the analysis of alternatives.

Management prescriptions were developed to represent alternative ways of managing portions of the Forest. These prescriptions are unique combinations of scheduled activities and practices.

The application of management prescriptions to analysis areas results in various streams of costs, resource outputs, and associated benefits over time. These were estimated by the interdisciplinary team. FORPLAN's matrix generator translated these factors into coefficients for the linear programming model.

Management prescriptions are allocated to analysis areas by FORPLAN, resulting in various mixes of goods and services. The mix of goods and services and the timing with which they are produced depends on the constraints applied and the objective function specified. Constraints could be in the form of land allocations (e.g., a certain portion of the Forest must be assigned to a dispersed, non-motorized management

prescription), output levels (e.g., a certain number of acres of old-growth forest must exist), input levels (e.g., budget cannot exceed a certain amount), or fluctuation in output levels (e.g., the timber harvested in one decade cannot be more than the amount harvested in a subsequent decade). The objective function is one criterion (e.g., maximization of present net value) which is optimized subject to first meeting all constraints.

Alternative A of this environmental impact statement requests the current direction under Final or Draft Forest Plans. Forest outputs are the same as in those Forest Plans with very minor exceptions of corrections or adjustments. Because Alternatives B, C, and D significantly change some outputs, notably allowable sale quantity (ASQ) which is a key issue in this analysis, Forests were asked to run their FORPLAN model for each alternative using the following modeling assumptions:

- All alternatives - maintain the same objective function (typically maximize present net value subject to meeting all constraints) as in the Final Forest Plan.
- Alternative A - Final Forest Plans, or estimate as to what Alternative A would have been before May 1990, with Spotted Owl Habitat Areas in place and managed according to the Regional Guides.
- Alternatives B, C, and D - all designated areas managed primarily for spotted owl habitat (see Chapter 2) are designated as "no scheduled harvest". Remaining lands managed for timber production must be managed to achieve or maintain at least 50 percent of the area in stands 11 inches or more in diameter with over 40 percent canopy closure (the 50-11-40 rule).
- Alternative D - the portion of the designated areas managed primarily for owl habitat that is outside of the Interagency Scientific Committee's recommended Habitat Conservation Areas (HCAs) contributes to meeting the 50-11-40 rule.
- Alternative E - Deferred and Reserved Multiple-Pair Areas (MPAs) are designated as "no scheduled harvest". Research MPAs must retain at least 80 percent of the nesting, roosting, and foraging habitat that would be present if the area were deferred. Connecting Habitat must be maintained at 30 to 50 percent nesting, roosting, and foraging habitat. At least 40 percent of the Owl Management Zone areas outside these categories must be managed to achieve or maintain at least 40 percent canopy cover and an average of greater than 20 feet of clearance under the canopy.



## **Other Modeling Considerations**

### **50-11-40 (Alts. B, C, and D) and 40-20'-40 (Alt. E) Rules.**

Because of the spatial nature of these dispersal habitat rules, these 'constraints' were not always modeled within the FORPLAN linear program. Some Forests elected to run their FORPLAN models without the 50-11-40 or 40-20'-40 rules. They then, manually and with planning data base maps, allocated the resultant harvest schedules to actual quarter townships or watersheds as required and determined what adjustments in timing or harvest rates were needed to meet the standard. Because management practices for maintaining visual resources, seral stage diversity, etc. also constrain harvest timing and rate, the effect, in both timing and magnitude, of such constraints is well understood. Forests were generally able to determine the effect of these rules on ASQ without having to complete this analysis entirely within FORPLAN.

## **California Alternative A Models**

The 13 National Forests in Oregon and Washington included in this analysis have all completed Forest Plans and have maintained the FORPLAN model constraint and data set relative to their Forest Plans, so that additional runs and comparisons are possible. The four northern California National Forests included in this analysis are working on Forest Plans at this time. For consistency, Alternative A considers what the Forest Plans were expected to look like early in 1990. Because these Forest Plans are not final, their model was not maintained at that time but is still evolving with their planning effort. For some of the Forests no exact model of Alternative A exists. This brings up two factors the reader should be aware of: 1) - Some parameters have been prorated from existing FORPLAN runs as closely matching Alternative A as possible, and 2) - Alternatives B, C, D and E are based on more recent models that consider some additional, newer information, such as that on the needs of furbearers, with the result that ASQ reductions between Alternative A and the other alternatives for the northern California National Forests are not entirely attributable to spotted owls. Some of those reductions are likely to be present in their Final Forest Plans regardless of the alternative selected here. The differences are consistent with past analysis.

## **Potential Volume Bias**

As discussed above, areas with similar attributes are grouped into analysis areas in FORPLAN. Because timber stands are variable, they are grouped into several different FORPLAN analysis areas depending

upon stand parameters such as volume per acre, species, and age. Spotted owl habitat corresponds to the older, higher volume analysis areas. However, even within an analysis area there is a range of volume levels. Designated areas managed primarily for spotted owl habitat tend to take the higher volume portion of the analysis area. The result can be that the actual volume for the portion of the analysis area still available for timber management is lower than the inventory volumes for that analysis area listed in the Forest Plan. If such a bias exists, all alternatives will actually yield lower ASQs. The bias would be similar in all alternatives and would not affect their relationship with each other. If such a bias is found on a particular National Forest, that Forest has the option of amending its Forest Plan at that time to reflect the reduction.

### **Forest Regulation and One Reason for the Use of Regeneration Harvesting**

Four to five decades ago, most of the National Forests within the range of the northern spotted owl were made up of generally old, high volume, slow growing forest stands. Younger stands, however, grow much faster on an annual basis and the optimum age for harvesting that maximizes annual growth in the Douglas-fir forest type is less than 100 years. Under the Forest Service policy of non-declining flow, planned harvest rates must not exceed the rate scheduled for all succeeding decades. The highest volume harvest schedule occurs if younger stands were harvested at the age that maximizes annual growth, while existing older stands sustain the harvest level during the time period needed to grow the younger regenerated stands to the optimum age.

Thus, the future harvest schedule is dependent upon the future availability of regenerated stands, while the current ASQ is dependent on the availability of remaining older stands. The ASQ on most National Forests is essentially the total standing volume available now, plus ingrowth, divided by the number of years until regenerated stands can be harvested.

Today, if all the older stands remaining in areas managed at least partly for timber production became unavailable for harvest, the ASQ would drop toward zero for two or three decades or more, until harvest could begin to take place in the regenerated stands created over the past 40 to 50 years. Even then, ASQ would still be significantly lower if only because of the reduced acreage available to the harvest schedule. Designation of previously scheduled stands for spotted owl habitat, particularly heavy volume stands, thus, has a disproportionate affect on the ASQ in the first decade and is one reason ASQ drops faster than acreage reductions.

### Part 3: IMPLAN

IMPLAN was the primary model used to develop estimates of employment and income. The IMPLAN system is a software and data base package that scales down the National input-output model of the United States economy built by the U.S. Department of Commerce Bureau of Economic Analysis to fit a desired group of counties. IMPLAN models are general economic "input-output" systems used to estimate the economic consequences of delivering products to meet demand by tracing supply requirements backward through all business linkages. At each stage of these backward linkages, persons are employed to produce the required products. IMPLAN models are usually constructed for a "local" economy (individual or groups of counties) affected by the activities of a particular National Forest. As a result, not all possible supply linkages are contained in these "local" economies. The total number of jobs gained or lost as a result of various levels of timber harvest from the National Forests are estimated as the sum of all jobs affected in the "local" economy through the backward supply linkages needed to deliver wood products to export (final) demand. This includes the direct, indirect, and induced effects.

The models were used to develop the relationship between the processing of the timber harvest and the total employment supported by it. These relationships provide a way to examine the employment implications of the expected harvest. Two factors could alter these estimates. First the mix of future processing (lumber, plywood, pulp, log exports, etc.) is not known. In addition, the multipliers are based upon present production technology which will continue to change in the future, changing the relationship between timber harvest and the number of jobs supported. Improvements in processing efficiency have continually reduced the labor requirements per million board feet of timber and these improvements are expected to continue into the future.

Estimates of timber-generated employment for the different alternatives were derived using empirical data on the timber industry in the Pacific Northwest and IMPLAN input-out models of the regional economics in the three States. The IMPLAN modeling system was developed by the Forest Service to assess the regional economic effects of changes in the availability of timber.

IMPLAN models trace the economic and employment linkages between the forest products industry and other sectors of regional and national economies. They portray the relationship between the processing of the timber harvest and the total employment it supports. The timber based employment estimates include jobs created directly in the forest products industry, those that are indirectly created in the supply industries, and those induced by changes in the level of economic activity as a result of wage and salary earnings. Direct industry jobs in Standard Industrial Classification (SIC) 24 and part of SIC 26 account for approximately two thirds of the total in most cases.

Revised IMPLAN models were developed for the Final Environmental

Impact Statement and provided job response coefficients for each of the affected counties. These coefficients were applied to the estimated timber harvest levels associated with each alternative. The resulting estimates of job loss by county were aggregated to the Forest level for each alternative.

The use of the IMPLAN model consisted of three steps: direct employment, indirect and induced multipliers, and job response coefficients.

1. Direct employment by sector was determined from empirical data.
2. Indirect multiplier effects were determined using the following steps.

Step One: Functional Economic Areas (FEAs) were identified by grouping counties into trading areas. This resulted in 16 multiplier generation areas.

Step Two: IMPLAN models for the 16 multiplier generation areas were developed.

Step Three: Two Metropolitan county economic impact models were developed using the Inter-Industry Modeling System (IMS). These models removed the dominating metropolitan economic influences from IMPLAN in timber-dependent local economies for King County (Seattle) and Multnomah County (Portland).

Step Four: The direct employment obtained from the empirical information was run through the IMPLAN models for 16 multiplier generation areas to estimate the indirect and induced effects.

3. Job response coefficients were developed by dividing the direct, indirect, and induced employment and income by the volume of timber.

The IMPLAN response coefficients used in the Final Environmental Impact Statement (Jobs per million board feet) are on average significantly higher than those used in the Draft. The Draft used an overall average employment multiplier of 10.6 jobs per million board feet. This multiplier included direct, indirect and induced employment. The Final uses an average regional multiplier of approximately 15 jobs per million board feet. The change in multipliers was made in response to public comments received about the Draft and reflects four changes. These changes are:

1. Inclusion of Federal employment directly in IMPLAN (which accounts for 2.3 jobs per million board feet).



2. Use of new procedures that links the estimates of direct employment per million board feet to empirical data (which accounts for 1.0 jobs per million board feet).
3. Use of new information on the mix of uses, such as lumber and veneer, for timber harvested from National Forests (which accounts for 0.8 jobs per million board feet).
4. Inclusion in IMPLAN of the processing of chips, peeler cores, and other byproducts from plywood and saw mills (which accounts for 0.3 jobs per million board feet).

#### **Part 4: Timber Assessment Market Model (TAMM)**

The Timber Assessment Market Model (TAMM) (Adams and Haynes 1980; Haynes and Adams 1985) is the model used to estimate the market impacts of alternative Forest Service timber harvest levels. The model reports regional and national effects on product and timber markets. It provides an integrated structure for considering the behavior of prices, consumption, and production in both the stumpage and product markets.

Projections from TAMM reflect the consequences of balancing the supply of timber and the demand for the final products made from that timber. The projections recognize that production and consumption are sensitive to both product prices and production costs. They also recognize that different types of landowners have different propensities for harvesting and managing their timberlands. Private harvests are treated as price and inventory responsive while public harvests are treated as fixed at predetermined levels. TAMM also includes an inventory projection system for private timberlands.

In the past decade, TAMM has been widely used within the Forest Service and by interest groups to estimate the market impacts of various policies and issues. The present version serves best as an indicator of long-term market trends. For example, in the 1989 RPA Timber Assessment, TAMM was used to make projections to the year 2040.

TAMM was used in this environmental impact statement to first establish a baseline projection using Alternative A. Then Forest Service timber harvest levels were changed and the market impacts were estimated as changes from the baseline projection. In comparing the alternatives, more emphasis should be placed on the difference from the baseline projection, than on the actual numbers in the projections themselves.

## Part 5: Modeling for Habitat Capability

Habitat capability for the northern spotted owl is the capacity of a given land area, in a particular geographic location, to support an estimated number of pairs given predictable amounts and distribution of habitat. Habitat capability is an evaluation of how many spotted owl pairs a land area might support; such pairs are referred to as potential pairs or pair-sites.

Habitat capability, as estimated in this assessment, has several components, including:

- Proportion of landscape that is habitat
- Distribution of habitat
- Relationship between annual owl pair home range area and proportion of habitat within the home range
- Overlap of home range between adjacent pairs of owls
- Correction factor for expected long-term occupancy of sites

The process for estimating habitat capability involved a number of steps, which differed between current and future habitat capability.

### Home Range Area

Results of ongoing research shows that home range area decreases as percent habitat within the home range increases. To estimate numbers of pair-sites in relation to amount of habitat, empirical relationships between the 100 percent minimum convex polygon annual pair home range area and percent habitat were calculated for each physiographic province using linear regression. Because annual pair home ranges are, on average, larger further north, separate regressions were calculated for Washington and Oregon/California. For both of these areas, home range sizes were predicted as a function of proportion of the landscape in habitat. Home ranges predicted to be smaller than the smallest known home range in each area were set equal to that of the smallest known.

For Washington, the calculated regression was:

- Home Range (acres) =  $18,364 - (17,607 * \text{Proportion Habitat})$ .

For the combined Oregon and California provinces, the regression was:

- Home Range (acres) =  $8,688 - (7,054 * \text{Proportion Habitat})$ .  
\* Proportion habitat ranges from 0 to 1.

For each of these areas, home range area was decreased by 30 percent to account for overlap among pairs. This factor was derived by calculating the average proportion of overlap between the 100 percent minimum convex polygon annual home range of a spotted owl pair, with that of the next closest pair, as reported in the literature. This correction

factor accounts for overlap of a pair's home range with only the next closest pair; it does not account for overlap of all other potentially overlapping pair home ranges in the general vicinity. Such multiple-pair overlap has not been studied in the field. Home range overlap was treated as a constant in all calculations, although it likely varies over time (seasons and years), by proportion of the landscape in habitat, and by other factors.

## **Calculation of Pair-Sites**

### **A. Current habitat capability**

1. A map of habitat within the range of the northern spotted owl was created for each National Forest.
2. Using geographic information systems (computer mapping), a grid of 5,000-acre rectangles was superimposed (overlaid) onto each map. The 5,000-acre area represents the average annual pair home range size across the subspecies' range.
3. Within each 5,000-acre rectangle, the proportion of habitat was measured.
4. Results were summarized in a table, showing total acres in 10 percent increments of proportion of habitat, that is, in increments of 0 to 0.1, >0.1 to 0.2, >0.2 to 0.3, and so on to 1.0.
5. Acreage in each percentage habitat class was divided by the predicted home range size (assuming 30 percent overlap) for each class. Expected home range was calculated using the appropriate regression equation evaluated at the midpoint of each habitat class (e.g., 0.05 for the interval 0 to 0.1).
6. Estimated total pair-sites or potential pairs for each habitat proportion class was adjusted using an updated table from the ISC Report (Thomas et al. 1990: 322). The table predicts the proportion of home ranges within the area that would still be occupied by a spotted owl pair, given the initial number of locally interacting (interbreeding) pairs and the proportion of the overall area in habitat. The table was derived from running a demographic simulation model of spotted owls and summarizing the proportion of all owl pairs remaining after 100 simulated years. This table was provided by Voss and Noon (Pers. comm.) and extended Table Q3 of the ISC Report (Thomas et al. 1990) for total pair-sites up to 100. For all alternatives, calculations of number of pair-sites or potential pairs at present were adjusted assuming all pairs interact in groups of at least 100 pairs; this is a reasonable assumption, as spotted owl pairs likely currently interact at least within each physiographic province.

### **B. Future Habitat Capability**

A slightly different procedure was used to calculate habitat capability for future years than for the present, because the



distribution of habitat will likely become much more clumped into reserves and designated areas managed primarily for spotted owl habitat. This will change the dynamics of how sets of spotted owls interact among local clusters of pairs.

1. Maps of designated areas managed primarily for spotted owl habitat under each alternative were analyzed to estimate total acres within and outside of designated area boundaries and acres unavailable to timber production.
2. Acres of habitat at year 150 were estimated inside and outside of designated areas managed primarily for spotted owl habitat using FORPLAN projections based on age-class distributions estimated Forest-wide (see Part 2, this appendix).
3. For land outside designated areas steps 4 and 5 under Current Habitat Capability were repeated for this data.
4. Lands within the boundary of each designated area under Alternatives B, C, D, and E were analyzed as if they would hold isolated clusters of spotted owl pairs. Total expected numbers of pairs were estimated by dividing home range size, based on percent habitat and corrected for overlap, into the total acreage of each designated area. Only clusters large enough to support five or more pairs of owls, prior to adjustment for occupancy, were analyzed as clusters. Smaller designated areas were considered part of the Forest Matrix in step 3 above.
5. Under Alternatives B, C, and E, expected occupancy rates within each designated area managed primarily for spotted owl habitat were estimated using the Voss and Noon table (Pers. comm.) based on estimated number of pairs and proportion of habitat. For lands outside of designated areas, habitat capability was adjusted by assuming all pairs occurred in clusters of five pairs, being the smallest cluster size analyzed by Voss and Noon and reported in the ISC Report (Thomas et al. 1990, Appendix Q3). For Alternative A, two correction factors were used. A LOW estimate was calculated assuming all pairs, whether inside or outside of designated areas, interacted in small clusters of five pairs. A HIGH estimate was also calculated, assuming all owls interacted in large clusters of 100 or more.
6. Under Alternative D, because all nesting, roosting, and foraging habitat is designated, all spotted owls were assumed to occur as clusters of 100 or more, whether they occurred inside or outside of designated areas managed primarily for spotted owl habitat.

### Part 6: Spotted Owl Habitat Calculations

Spotted owl nesting, roosting, and foraging habitat is reported using Forest data for the current time and three points in the future: 50, 100, and 150 years. The acreage of spotted owl nesting, roosting, and foraging habitat over time is calculated as a sum of three categories. These are: 1) acres of habitat within reserved areas, 2) acres of habitat on lands not reserved but otherwise unsuitable for timber production, and 3) acres of habitat on lands suited for timber production. A

description of each of these components and their calculations and sources follows.

**Habitat within Reserved Lands.** Reserved lands are defined as areas withdrawn from timber production by authority of the Chief of the Forest Service or higher. These lands include Wildernesses and some Wild and Scenic Rivers. Acres of existing habitat on these lands were determined through inventories done by each National Forest. The majority of these lands have never been harvested. In addition, succession, site quality, and fires, among other factors, are assumed to be at an equilibrium. Therefore, the existing owl habitat is considered to be constant through time and over all alternatives.

**Habitat on Lands Unsuitable for Timber Production.** Lands unsuitable for timber production are defined as areas which are not reserved, but are still not suitable for timber harvest due to Forest Plan land allocations, designation for spotted owl habitat protection, or some other resource consideration.

Lands in this category which are currently suitable as spotted owl habitat are assumed to remain as such since they will not be subject to further timber harvesting.

Additionally, it is anticipated that some of these lands which are not currently suitable spotted owl habitat will grow into spotted owl habitat (ingrowth) in the future. It is assumed that ingrowth of habitat would only occur on lands which were tentatively suitable for timber production, but which are not presently suitable as spotted owl habitat. These lands contain a high proportion of plantations and other second-growth forests which are considered highly capable of growing into spotted owl habitat. We assume 80 percent of these lands will grow into owl habitat in 150 years, at a constant rate. The other 20 percent of these lands are on sites which would never be capable of obtaining spotted owl habitat characteristics.

**Habitat on Lands Suitable for Timber Production.** The rate of change in spotted owl habitat on suitable timberlands was taken from FORPLAN runs submitted by the National Forests included in this analysis. This information was derived in three steps.

- Step 1 - Definitions of habitat characteristics submitted by each National Forest were examined.
- Step 2 - These characteristics were then compared to information contained in the Forest's growth and yield tables contained in their FORPLAN runs to determine at what age each stand would meet these conditions.
- Step 3 - FORPLAN reports were then generated to display how many acres were old enough to meet these habitat characteristics over time. In general, these reports indicated a steady decline in habitat over time. The FORPLAN reports indicated some ingrowth, however this

## Appendix B

ingrowth was typically limited to lands managed under long rotations, and specific timber harvest prescription objectives, such as managing for other wildlife habitat and visual retention corridors.

# C

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## Appendix C

### Management of Other Lands



# Appendix C

## Management of Other Lands

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### Introduction

This appendix provides an overview of how other land managers and landowners are managing spotted owl habitat. For specific information concerning proposals to change spotted owl habitat management direction on these lands see Appendix E, Related Activities.

A sound conservation strategy for the northern spotted owl relies on the management of habitat on more than just National Forests. The purpose of this appendix is to list agencies and organizations other than the Forest Service that also manage land within the range of the northern spotted owl. Some of these agencies play a crucial role in providing habitat or management direction for spotted owls.

In June 1990 the U.S. Fish and Wildlife Service published "Interim Procedures Leading to Endangered Species Act Compliance for the Northern Spotted Owl." This document includes formal consultation guidance for Federal projects, interim recovery strategy, conservation planning for nonfederal actions, and guidance for incidental take. Under the Endangered Species Act, U.S. Fish and Wildlife Service guidelines refer to incidental take as an activity indirectly affecting spotted owls, such that they may not survive, as in removal of habitat (USDI 1990a). This action is the foundation of all Federal, State, local, and private activities pertaining to the conservation of the northern spotted owl.

**Abbreviations.** The following is a list of abbreviations commonly used in this appendix:

- BLM - Bureau of Land Management (USDI)
- FWS - U.S. Fish and Wildlife Service (USDI)
- HCA - Habitat Conservation Area
- ISC - Interagency Scientific Committee
- USDI - U.S. Department of the Interior
- WDNR - Washington Department of Natural Resources
- WDW - Washington Department of Wildlife

### Federal Agencies

#### Bureau of Land Management

The Bureau of Land Management (BLM) is an agency of the U.S. Department of the Interior which administers lands within the range of the northern spotted owl in Washington, Oregon, and California. BLM lands in western Oregon predominantly occur in a



“checkerboard” pattern of alternating sections (1 square mile, or 640 acres) of intermingled private and public ownership. Only BLM lands in Oregon and California are occupied by spotted owls. Most of these lands are in Oregon. Because of topographic features, inherent plant community types, and land ownership patterns, BLM lands in the State of Washington have limited potential to support spotted owls.

### **Oregon BLM Current Situation and Management Status**

Between 1978 and 1983, the BLM completed seven timber management plans for the 2.4 million acres of land administered by the five western Oregon Districts. Through the Records of Decision for these plans, habitat was provided for 79 pairs of spotted owls under the 1977 Oregon Interagency Spotted Owl Management Plan (BLM’s first plan for spotted owl management). These guidelines called for habitat areas with at least 300 contiguous acres of old-growth or next-oldest forest to be surrounded by an additional 900 acres managed so as to maintain at least 50 percent of that area in stands older than 30 years.

Of the seven management plan decisions, only the two plans in the Medford District, completed in 1979 and 1980, specifically protected spotted owls by excluding timber harvesting on commercial forest lands. Under the remaining five plans, which were completed in 1983, spotted owl habitat was managed through land allocations for other resource management purposes. These allocations included maintaining old-growth forest ecosystems by withdrawing them from the commercial forest land base and using longer harvest rotations that constrained timber harvest in specific areas.

In 1983, the BLM and the Oregon Department of Fish and Wildlife entered into an agreement for managing spotted owl habitat on BLM lands in western Oregon. This 5-year agreement expanded on previously completed land use plans by adding an additional 11 management areas, which brought the total to 90. In 1987, the agreement was revised and will remain in effect until the Resource Management Plans for BLM lands for the 1990’s are completed. A longer-term management strategy for the spotted owl will be spelled out in these plans, which are projected for implementation in October 1992. The 1987 agreement established constrained timber harvesting areas (Agreement Areas) around 110 spotted owl locations. These areas are distributed across the five western Oregon BLM Districts encompassing 230,400 acres. They are to be managed to maintain a distributed population of 90 pairs of spotted owls on BLM lands. The actual number of areas under the BLM-Oregon Department of Fish and Wildlife Agreement is now 109 because lands containing one area were transferred to the Bureau of Indian Affairs Grande Ronde Tribe and have not been replaced. This reduced the total area under the agreement to 228,000 acres.

The individual Agreement Areas were delineated around known spotted owl locations, determined through inventory and monitoring efforts. The guidelines for developing each area included the goal of delineating at least 2,200 acres of conifer forest over 80 years old, and that these areas be no farther than 3 miles from the known activity center of a single owl or pair of owls. Exceptions occurred where the amount of forests greater than 80 years old did not exist within the 3 mile limit or where the parties agreed to use on-site information on home range size collected by using radio telemetry. This strategy sometimes resulted in delineation of more than 2,200 acres and sometimes less: Agreement Areas range from 734 to 4,188 acres. The average amount of forest greater than 80 years old in Agreement Areas is nearly 2,100 acres.

In 1989, an additional 12 habitat areas were established and given one year interim protection as a result of instructions to the BLM in Section 318 of the Fiscal Year 1990 Interior Department Appropriations Act. These 12 areas were created under the same guidelines used for the BLM-Oregon Department of Fish and Wildlife Agreement Areas. The addition of these habitat areas brought the total to 121. BLM is deferring harvest of selected forest stands in these areas. This management course is based on stipulations in the BLM-Oregon Department of Fish and Wildlife agreement and direction in the Fiscal Year 1990 Interior Appropriations Act.

These 121 Agreement Areas provide specific protection for about 20 percent of the known spotted owl pairs occurring on BLM lands in Oregon, based on data collected from 1986 through 1990. Additional pairs and individual, unpaired spotted owls may live within the boundary of a given Agreement Area, but habitat was allocated with the intention of maintaining only one pair in each area over the long term.

Current direction for BLM lands is specified in the following (Lint, Pers. comm):

BLM's current direction addresses the 1992 timber sale plans and spotted owl management by directing the field offices to offer the maximum volume of timber within the constraints of present western Oregon forest land use and timber management plans, while keeping spotted owl management protection options open to be resolved in the 1990's resource management plans.

The following guidelines provide the means to accomplish the above objective.

1. Offer regular green timber sales within the remaining 109 spotted owl habitat sites established under the 1987 agreement between BLM and the Oregon Department of Fish and Wildlife, and the 12 sites identified

under Section 318 of Public Law 101-121. Any salvage sales will require concurrence of the Oregon Department of Fish and Wildlife.

2. Avoid placement of regular green timber sales in proposed Habitat Conservation Areas (HCAs) Categories 1, 2, 3 and 4 of the Interagency Scientific Committee (ISC) report and/or mapped on our spotted owl maps and overlays. Salvage sales may be offered in the HCAs if there will be no effect on the owl or its habitat if through consultation with the U.S. Fish and Wildlife Service the sale is cleared for harvest.
3. When possible honor the "50-11-40" rule as outlined in the ISC Report in developing the FY 1992 timber sale plans.
4. Consult on all timber sale actions that constitute a "may affect" situation on the northern spotted owl or its habitat. Implement the mandatory terms and conditions in the U.S. Fish and Wildlife Service biological opinion to minimize incidental take and as appropriate, implement the recommended conservation measures.
5. Submit all timber sale actions to the U.S. Fish and Wildlife Service for informal conferencing if they may result in the destruction or adverse modification of the proposed critical habitat for the northern spotted owl or if they adversely affect the marbled murrelet.

In June 1990 the Bureau of Land Management in Oregon received "jeopardy opinions" on 44 proposed timber sales. Consequently, on September 11, 1991, the BLM applied for an exemption from the requirements of the Endangered Species Act under Section 7(g) for these 44 timber sales.

### California BLM Current Situation and Management Status

In California, northern spotted owl habitat is located in the Ukiah District of the BLM. Direction for spotted owl management in California is described in an excerpt from the ISC Report (Thomas et al. 1990). In 1980 the Ukiah District drafted an environmental impact statement on timber management which includes spotted owl and managed old-growth forest mitigation. The habitat mitigation measure at that time was to provide 300 acres for each pair of spotted owls. The Ukiah District environmental impact statement called for 300 acres, *or where available more*, for each pair (emphasis added). The reason that "*or where available more*" was added to the 300 acre mitigation provision was that most of the timber stands in the Arcata and Redding Resource Areas were less than 300 acres in size. Moreover, these tracts are rarely adjacent to other agency lands. As a result of the Ukiah District environmental impact statement and other planning efforts, over 13,000 acres of known and potential spotted owl habitat have been withdrawn from the Ukiah District's timber base. The 13,000 acres of



spotted owl habitat are within 20 different tracts of land. Six of these tracts have been designated as Old-growth Forest Research Natural Areas/Areas of Critical Environmental Concern.

In addition to the area covered by the above environmental impact statement, the Ukiah District has 32 HCAs, some of which are shared with the Forest Service. The Arcata Resource Area has the majority of the HCAs, totaling 26. Management in the Ukiah District, while not adopting the ISC Strategy, is following the strategy fairly closely. No timber sales are being planned in the HCAs, and for most lands outside the HCAs the 50-11-40 rule is being followed.

Each Resource Area is in the process of completing a Resource Management Plan. No timetable is available.

### **National Park Service**

The spotted owl is known to occur in eight National Park Service areas including North Cascades, Mount Rainier, and Olympic in Washington; Crater Lake and Oregon Caves in Oregon; and Redwood, Point Reyes, and Muir Woods in California. Spotted owls may also occupy the Whiskeytown National Recreation Area because owls are known to occur in that region of California. National Park Service areas may contain as much as 570,000 acres of nesting, roosting, and foraging habitat. Estimates are currently being refined as inventories of old-growth forests are completed.

Generally, the management objectives for National Parks are considered compatible with maintaining spotted owl habitat. National Park Service policy states that, "Natural resources will be managed with a concern for fundamental ecological processes as well as for individual species and features. Managers and resource specialists will not attempt solely to preserve individual species (except threatened or endangered species) or individual natural processes; rather, they will try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and ecological integrity of the plants and animals" (Thomas et al. 1990). The emphasis on maintaining ecological processes as opposed to particular biological states may be relevant to managing spotted owls, especially in the large parks. Natural fires are recognized as a force that often drives processes of plant succession, and thus they are to be perpetuated in the parks (Thomas et al. 1990). Historically, fires in parks containing spotted owls ranged from frequent, low-intensity, surface fires to infrequent, stand-replacing crown fires (Thomas et al. 1990). The effects of surface fires on spotted owl habitat are poorly understood; crown fires, however, clearly reduce habitat. The amount of nesting, roosting, and foraging habitat in National Parks can thus be expected to vary over

time, to the extent that natural disturbances are allowed to operate. Over long periods of time, maintaining mosaics of different-aged forest communities in parks (which differ in fuel loading and susceptibility to burning) may be an important means of reducing the probability of catastrophic large fires (Thomas et al. 1990).

Policies of the Pacific Northwest Region of the National Park Service state: "Since single species management is inconsistent with National Park Service management policies, the National Park Service will not designate formal Spotted Owl Management Areas (SOMAs). This should not be construed to mean that the spotted owls within parks are not to be considered in a larger regional planning effort. On the contrary, the National Park Service fully expects that any regional planning effort will incorporate spotted owl data for the park and address the National Park Service's shared concern for long-term preservation of the species" (Thomas et al. 1990).

There has been no change in the National Park Service management guidelines for the northern spotted owl since the spotted owl was listed as threatened by the U.S. Fish and Wildlife Service.

## U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (FWS) has two National Wildlife Refuges in Washington and two in Oregon within coniferous forests within the range of the northern spotted owl. In Washington, the Willapa National Wildlife Refuge on Long Island along the southern coast contains about 5,000 acres of coniferous forest, including a 274-acre old-growth *reserve natural area* that previously contained a pair of spotted owls. Those spotted owls disappeared about 5 years ago and have been replaced by a pair of barred owls. Annual surveys since then have not indicated any spotted owls in the area. Most of the 5,000 acres outside of the reserve are now available for timber production because of an agreement tied to its acquisition. Timber harvesting can be curtailed, however, if spotted owls are observed in the area. The other National Wildlife Refuge in Washington is Conboy Lake. It contains about 1,500 acres of coniferous forest on the eastern side of the Gifford Pinchot National Forest. No spotted owls have been observed on this refuge, although they have been heard in the vicinity, and no timber production is permitted.

Cape Meares National Wildlife Refuge in Oregon has only 138 acres of old-growth forest which are administered as a *Research Natural Area*. Although spotted owls have been observed in the area, their regular occurrence on the refuge has not been confirmed. The Bear Valley National Wildlife Refuge near Worden, Oregon, along the border with California contains about 4,000 acres of older ponderosa pine, with a

mix of other coniferous types. Timber production does not occur on this refuge and the area has never been surveyed for spotted owls.

### **Fort Lewis Military Reservation**

South of Tacoma, the Fort Lewis Military Reservation includes about 68,000 acres of contiguous forest, generally between 50 and 70 years old. Current plans are for intensive, uneven-aged management on 40,000 to 45,000 acres. Some lands will be left in natural condition but no estimate of acreage is currently available. The nearest known spotted owl pair is located about 15 miles southeast of the reservation on the Gifford Pinchot National Forest.

Spotted owl surveys to date have been done in older stands along the Nisqually River, but most of the military reservation has not been surveyed.

### **Indian Tribal Lands**

Lands of the Quinault, Makah, Yakima, Confederated Warm Springs, Confederated Grande Ronde, Siletz, Hoopa, and Round Valley Tribes contain significant acreages of forest. These lands are primarily managed for timber production and most areas have already been harvested. The amount of nesting, roosting, and foraging spotted owl habitat, as well as the number of owls, are now being determined on a project-by-project basis.

In Washington, the Quinault Indian Reservation has about 4,000 acres of older forest west of Lake Quinault, which was recently acquired from the Olympic National Forest. Two spotted owls were located on this parcel in 1989. In 1991, inventories found one pair (Ogden, Pers. comm.). No estimate of nesting, roosting, or foraging habitat is available at this time. Seven pairs and three single owls have been found on Yakima tribal lands since 1990 (Ogden, Pers. comm.). They manage 123,000 acres of forest land, about half of which may be nesting, roosting, and foraging habitat for spotted owls. There are several small reservations in the Puget Sound area and one on the tip of the Olympic Peninsula that have not had any surveys or acreage estimates completed to estimate spotted owl nesting, roosting, and foraging habitat. It is assumed that no spotted owls exist on these lands.

In Oregon, three tribal lands fall within the range of the northern spotted owl. The Grand Ronde Tribe in the western Oregon Coast Range has 9,800 acres of commercial forest land in a contiguous block that is greater than 120 years old. This is a fir forest type on a harvest rotation of less than 80 years. One pair of spotted owls has been known to occur here since the 1970's. It is estimated that 1,100 acres are nesting, roosting, and foraging habitat for spotted owls (Ogden, Pers. comm.). The Siletz Tribe also has land in the Oregon Coast Range.



## Appendix C

This land is composed of about 3,600 acres scattered in small parcels less than 120 years old. It, too, is harvested on a rotation schedule of less than 80 years. These lands are not expected to support spotted owls because of their scattered nature. The Warm Springs Confederated Tribe in the eastern Cascades has 311,000 acres of commercial forest land in large contiguous blocks ranging in age from seedlings to trees greater than 120 years old. About half of this land is in ponderosa pine, generally unsuitable for spotted owl habitat, and about 60,000 acres are reserved for purposes other than timber production. Harvest rotations are 80 to 120 years in the fir zone. The 1991 spotted owl surveys found 13 pairs with approximately 26,000 acres of nesting, roosting, and foraging habitat (Ogden, Pers. comm.).

In California, the Hoopa Tribe has found 22 pairs of spotted owls scattered over 25,000 acres of nesting, roosting, and foraging habitat. The Round Valley Tribe has found two pairs of spotted owls on approximately 8,000 acres of timberland. No estimate of spotted owl nesting, roosting, and foraging habitat on these tribal lands is available at this time.

The above information is estimated from the results of 1991 surveys conducted on timber sale areas adjacent to or in the immediate area of these tribal lands (Ogden, Pers. comm.).

Current general policy for tribal lands is that they will meet U.S. Fish and Wildlife Service guidelines (USDI 1990a). Managing for dispersal habitat varies by reservation.

### Washington Current Situation

#### Washington Department of Natural Resources

The Washington Department of Natural Resources (WDNR) manages about 1,833,000 acres of State forest lands, primarily to produce funds for public school construction. Approximately 50 spotted owl activity centers occur on WDNR lands. Thirty of these are located on the Olympic Peninsula; the remainder are in southwest Washington and the east Cascades. In addition, approximately 250 spotted owl activity centers occur within 2.5 miles of WDNR lands (1991 Washington Department of Wildlife Interagency Spotted Owl Database, Olympia Washington)

In 1988, Public Lands Commissioner Brian Boyle established a Commission on Old-Growth Alternatives for Washington's Forest Trust Lands. The Commission was concerned exclusively with old-growth forest in the northwest corner of the Olympic Peninsula. The Commission's recommendations were to defer from harvest 15,000 acres of old-growth forest for 15 years. These areas were selected to provide habitat for four pairs of owls in the Hoh-Clearwater for 15 years.

The Commission also recommended alternative silvicultural practices designed to retain ecological characteristics of old-growth forests in timber harvest areas on WDNR-managed lands in the northwest portion of the peninsula. This plan, although it preserves options for four pairs of spotted owls and provides for research, does allow for timber harvest at the end of the 15-year period.

## **Washington Department of Wildlife**

The Washington Department of Wildlife (WDW) manages several large wildlife areas adjacent to the Wenatchee National Forest that could provide spotted owl nesting, roosting, and foraging habitat. About 5,000 to 10,000 acres in the Colockum Wildlife Area may provide nesting, roosting, and foraging habitat for spotted owls within the next 30 years. Over 20,000 acres in the L.T. Murray Wildlife Area could provide nesting, roosting, and foraging habitat within 100 years. Long-term management goals on WDW lands will be to manage more than 50 percent of forest lands to produce old-growth characteristics. No spotted owls are currently known to exist on or near WDW lands.

## **Washington State Parks**

Washington State Parks manages several widely scattered, forested parcels within the known distribution of the spotted owl. No standing timber over 10 inches in d.b.h. is harvested unless conflicts occur with roads, trails, or campground facilities. Of particular importance to spotted owl habitat are Beacon Rock State Park (4,500 acres), located along the Columbia River near Stevenson; Lake Easton (200 acres) and Olale (350 acres) State Parks, located along Interstate 90 in the central Cascade Range; Federation Forest State Park (600 acres of old-growth forest), located along the White River near Enumclaw; and Rockport State Park (500 acres of old-growth forest), located along the Skagit River in the North Cascades. These State Parks may provide important linkages and travel corridors for spotted owls.

## **Private Lands**

Approximately 60 spotted owl activity centers are currently known to occur on private lands in Washington. Nine of these are located on the Olympic Peninsula, 20 occur west of the Cascade Crest, and approximately 30 are known to occur in the east Cascades (1991 Washington Department of Wildlife Interagency Spotted Owl Database, Olympia, Washington). A substantial portion of these sites were located in 1991 when intensive surveys of many private lands were initiated. An

additional number of spotted owl activity centers are within 2 miles of private land in Washington, and owls there likely use remaining older stands that might occur on these lands.

## Washington Management Status

The northern spotted owl is listed as Endangered by the Washington Department of Wildlife. WDNR Owl Memo No. 3 of March 5, 1991, regulates forest practices to protect the northern spotted owl as granted and governed by State law (Stearns 1991). The following guidelines for processing and imposing conditions on forest practices applications are based on the Forest Practices Act, State Environmental Policy Act, and biological information and recommendations from the FWS and the WDW. These are guidelines only and may be adjusted on a case-by-case basis based on site-specific information and consultation with the landowner, WDW and/or the FWS and the requirements of the State Environmental Policy Act and the Forest Practices Act. Federal law may impose additional requirements on the landowner.

The WDNR guidelines are as follows:

1. Surveys will be conducted in habitat within 1.8 miles (2.2 miles on the Olympic Peninsula) of known pair and resident single sites.
2. Protection will be given to pairs and resident singles detected in survey areas.
  - a. Keep 40 percent of habitat within 1.8 miles (2.2 miles on the Olympic Peninsula) of pair or resident single site.
  - b. Keep 500 acres of habitat within 0.7 mile of pair or resident single site.
  - c. Delineate 70 acres of best habitat around pair or resident single site.
3. There are timing restrictions for certain activities around pairs and resident singles: vehicle traffic, blasting, helicopter flights, and smoke from slash burning.
4. A description of suitable spotted owl habitat.
  - a. Discuss western and eastern Washington separately.
  - b. Describe suitable habitat types A, B, and C, with A being the best and C defined on the basis of use by spotted owls (Stearns 1991).

Beyond the State guidelines, the landowner is also required to meet FWS guidelines (USDI 1990a).

## **City of Seattle**

The Seattle Water Department currently manages about 68,000 acres of forest land in the Cedar River Watershed near North Bend. About 3,000 acres remain in old-growth forest. Current management provides for the preservation of all existing old-growth forest. In addition, 50 to 65 percent (about 40,000 acres) of second-growth forest will be managed as a permanent reserve. Three single spotted owls and one pair have been located in intermingled lands on National Forests and City of Seattle lands within the watershed.

## **Oregon Current Situation**

### **Oregon Department of Fish and Wildlife**

The Oregon Department of Fish and Wildlife manages two partially forested properties within the range of the northern spotted owl, one on the south coast adjacent to Eel Lake (619 acres), and a larger area on the eastern slope of Mount Hood known as the White River Management Area. This area is about 30,000 acres, of which about 8,600 acres are in mixed conifer-pine-oak woodlands. An existing timber management plan for Eel Lake allows timber harvest to generate funds for wildlife management programs throughout the State. Timber is second-growth, even-aged, and generally about 50 years old. The White River Management Area has received some small harvest units in the past, but no additional harvesting will occur until a forest management plan is completed. The forest has a mean age of 60 to 70 years, with scattered older trees throughout ranging from 130 to 160 years old.

White River Management Area personnel conducted spotted owl surveys during the spring of 1991 and recorded no owl responses. Approximately 160 acres of the wildlife area contain nesting, roosting, and foraging habitat for spotted owls (Cooper, Pers. comm.).

### **Oregon State Board of Forestry and State Land Board**

The Oregon Department of Forestry manages 786,000 acres of forest lands in Oregon—654,000 acres under its own jurisdiction and 132,000 acres managed by the Division of State Lands. The Division also manages the South Slough Sanctuary near Coos Bay, which includes a 3,800-acre block of upland forest. Most Oregon Department of Forestry lands are in western Oregon, but one major block, known as Sun Pass Forest, is on the east slopes of the Cascades. The department manages about 625,000 acres of their own forest lands within the range of the spotted owl and also about another 120,000 acres of State Land Board lands. In western Oregon, 25,000 acres of the State forest land base is reserved for purposes other than timber management, such as watershed



protection, fish and wildlife habitat, and administrative purposes. These reserved areas are scattered throughout State forest lands, generally in small patches or corridors.

The Oregon Department of Forestry has harvested an average of 4,600 acres per year for the last 10 years. Currently, 12 percent of the forests on these State lands in western Oregon are more than 80 years old; 74 percent of the forests are less than 50 years old. With a planned average rotation age of 70 years, all forests over 80 years old would be harvested in about 17 years. The South Slough Sanctuary block is less than 50 years old and acreage has been logged from one to three times. The Sanctuary area is being managed as a reserve. The Elliott State Forest has the best potential spotted owl habitat. A unique feature of the Elliott Forest is that it consists mainly of trees ranging from 90 to 140 years old. The Elliott Forest is 93,000 acres in size and approximately 50,000 acres of this forest currently contains habitat suitable for owls. Intensive survey efforts in 1991 located 20 pairs and 19 single owls in the Elliott State Forest. Sun Pass Forest is managed primarily as an uneven-aged forest and may provide some nesting, roosting, and foraging habitat for spotted owls.

Spotted owl surveys on State forest lands were initiated in 1991. Seventeen sites were located on the Clatsop and Tillamook Forests. Approximately 67 sites were known to be on or immediately adjacent to State lands as of the end of the 1991 field season.

## Oregon State Parks

The Oregon State Parks Department manages about 165 parks and waysides in western Oregon, ranging from 1 to 8,700 acres with an average of 280 acres. Many areas have some forest land, but only 13 are known to have more than 90 acres (the range is 90 to 2,500 acres) of forest more than 80 years old. Forested lands usually are fairly contiguous, but 50 percent of the mature forest is found in only two parks: Silver Creek Falls and Oswald West.

About 50 percent of the parks have management plans. Current direction for forest lands is generally protection, except that individual trees considered safety hazards can be removed. The master plan for Silver Creek Falls calls for thinning 1,500 to 2,000 acres of young stands to enhance tree growth and stand health.

Preliminary surveys for spotted owls in State Parks began in 1989. Two pairs of owls are currently located in Silver Creek Falls Park. Spotted owls have been reported on Christmas bird counts near Cape Meares Park but none were found during the 1991 summer surveys. Additional surveys are being planned in selected State park lands in 1992.

Although habitat for spotted owls is expected to increase on State park lands in future years, few are expected to have enough nesting, roosting, and foraging habitat to support breeding pairs. Because of the wide distribution of park lands, some parks are supporting dispersing spotted owls.

## **Oregon Counties and Cities**

At least 142,000 acres of forest lands are owned by county and municipal governments in western Oregon. These lands are primarily located in 16 of the 19 counties. Land parcels are generally scattered, but some counties have larger blocks of a section or more. Coos County has two of the largest individual blocks of commercial forest land, one with 2,200 acres and the other with 11,000 acres. From preliminary information, most county forest lands are generally young to mid-aged but less than 100 years old. Timber management plans usually call for shorter rotations, although municipal watershed plans may call for a combination of reserved and managed forests. Some older timber exists on some lands.

Based on statewide figures, at least 35,000 acres of city and municipal forest lands are reserved for various purposes such as parks and watersheds. Forest Park in the city of Portland, for example, contains 4,300 acres of younger mixed-conifer/hardwood forest. In Federal fiscal years 1987 and 1988, local governments harvested this timber on an average of 1,800 acres per year (amounting to a 60-year rotation). In addition, 1,000 to 3,000 acres were partially cut.

County and municipal lands generally have not been surveyed for spotted owls. One pair is known to nest in the Corvallis watershed, where habitat is a mix of mature and old-growth forest.

## **Private Lands**

Private lands in western Oregon encompass about 6,200,000 acres of forest land, of which about 10 percent are considered incapable of producing commercial forests. Additional private land occurs along the eastside of the Cascades, but published inventories are insufficient to identify those that may be within the range of the spotted owl. It is estimated that there is about 100,000 acres of commercial forest lands on the east side of the State.

Private lands are divided into "forest industry," usually owned by large companies and "other private," which are owned by individuals. Forest industries own about 4,046,000 acres of commercial forest lands and other private landowners about 1,858,000 acres.



Based on 1985-86 inventories, 80 percent of forests on industry lands are less than 50 years old and 90 percent are less than 80 years old. In fiscal years 1987 and 1988, the forest industry clearcut an average of 60,000 acres and partially cut 43,000 acres per year. Fifty-six percent of other private forest lands are less than 50 years old and 89 percent are less than 80 years old. In the same years, an average of 27,000 acres were clearcut and 65,000 acres were partially cut. Based on the above harvest rates and a known decreasing rotation age, most spotted owl nesting, roosting, and foraging habitat on lands managed under even-aged methods will be removed in less than 10 years.

Systematic surveys for spotted owls have not been done on private lands, although extensive surveys have occurred in association with Federal and State land surveys and research. Where BLM checkerboard lands occur, limited surveys have been conducted on private lands. In demographic study areas, such as on the Roseburg District, nearly all private land has been surveyed. About 50 pairs have been located on private lands statewide in the last 5 years.

## Oregon Management Status

The spotted owl is listed as Threatened in Oregon by the Fish and Wildlife Commission. Under Oregon's listing of threatened and endangered species, such a listing requires that protection be given the species on State lands only; not private lands. All State agencies must coordinate with Oregon Department of Forestry when a project or action may affect a listed species. Forest management operations on State and private lands are governed by rules under the Oregon Forest Practices Act. The Oregon Forests Practices Act was amended in 1987 and requires that the Board of Forestry adopt rules to protect State-listed species or nest sites of sensitive birds. Interim rules have been adopted that require a written plan to be approved by the State Forester when any forest operation is proposed within 300 feet of a nesting or roosting site of a listed species.

Since the FWS listed the spotted owl as Threatened, the State has been managing in accordance with the FWS guidelines on State lands (USDI 1990a).

## California Current Situation

### California Department of Forestry and Fire Protection

The California Department of Forestry and Fire Protection (CDF) manages three State Forests, totaling 53,648 acres, within the range of the northern spotted owl. The portion of these lands containing nesting, roosting, and foraging habitat for spotted owls is unknown. The Jackson State Forest is in coastal Mendocino County and contains slightly more than 50,000 acres of redwood forest with some Douglas-fir. The redwood forest is second-growth, with about 1,000 acres of

old-growth forest remaining in scattered parcels of less than 80 acres. Ponderosa pine covers about 90 percent of Boggs Mountain State Forest farther inland in southwestern Lake County. The 160-acre Ellen Pickett State Forest is near Weaverville in eastern Trinity County.

Spotted owls are known to occupy six sites in the Jackson State Forest but have not been reported from the Boggs Mountain or Ellen Pickett State Forests. Surveys in 1989 disclosed three pairs and two single spotted owls at five sites in the Jackson State Forest. A single owl was located at a sixth site in 1974, but that area has not been checked for spotted owls since then. No spotted owl surveys have been done on the other two forests. The dry, inland pine-forest type on the Boggs Mountain Forest is not known to regularly support spotted owls.

Both the Jackson and Boggs Mountain State Forests have active sale programs and are managed with the intent of providing a sustained yield of saw timber. At the Jackson State Forest, both clearcutting and selective cutting are used. Rotation age is about 80 years, although good growth rates in redwood continue beyond 100 years of age. With an annual cut of about 30 million board feet, and possible extension of the rotation age to more than 100 years, the current quantities of forest in various age groups should remain relatively stable or show an increase in older, second-growth forest.

Small educational and recreational facilities exist on both forests, but they do not significantly influence the timber management program. A minor land exchange program is aimed at consolidating holdings, but no significant changes are planned.

## **California Department of Fish and Game**

The California Department of Fish and Game does not manage any State lands with nesting, roosting, and foraging habitat for the northern spotted owl.

## **California Department of Parks and Recreation**

The California Department of Parks and Recreation manages 28 park units on the north coast of California that are within the range of the northern spotted owl and contain potential habitat. These units occur in Del Norte, Humboldt, Mendocino, Sonoma, Napa, and Marin Counties and total 132,625 acres. About 56,000 acres are nesting, roosting, and foraging habitat, 88 percent in old-growth redwood types and another 5 percent in second-growth redwood forest.

The State park units are small; with all but two smaller than 10,000 acres and nine smaller than 1,000 acres. Eighty blocks of nesting, roosting, and foraging habitat were identified from the 28 units; stands in these units ranged from 12 to 3,361 acres and averaged only 563 acres. Only three units currently contain enough nesting, roosting, and foraging habitat to individually sustain a pair of spotted owls, based on recent radio telemetry studies of home range sizes in this region.

Records of spotted owls are verified at 27 sites in 19 units. Two units have unverified records, and spotted owls have been reported near two other units since 1973. In the last 5 years, however, owls were recorded from only 12 different sites (eight pairs and four singles) in nine units. This estimate is undoubtedly low because extensive recent surveys have been done on only four units. All other units need complete inventories.

State parks are managed for their natural qualities and for recreation. No tree cutting occurs except where necessary for safety, to maintain healthy forests, and to develop recreational facilities. In general, habitat management policy is to maintain the natural qualities of the redwood parks, which serve to maintain old-growth forests and provide long-term benefits for spotted owls.

Management plans for the north coast park units are being developed. Because of limited information about spotted owls within each unit, plans often do not specifically address this species. Management trends will continue to benefit spotted owls as second-growth forests mature and become spotted owl nesting, roosting, and foraging habitat. There is no current estimate of the amount of habitat expected to become suitable in the future.

### California Lands Commission

Currently, the California Department of Forestry and Fire Protection manages 3,836 acres of California Lands Commission property in 18 parcels throughout the State. Twelve of these small parcels, ranging from 11 to 640 acres, are in the Shasta-Trinity area. The 10-year management agreement between these two agencies expires in the mid-1990's.

The situation on other Lands Commission parcels is not currently known. There are no other major blocks of State land not already managed by another State agency in the range of the spotted owl in California. Any remaining small parcels are likely to be scattered school lands: the mile-square sections 16 and 36, granted to the states. Such areas are relatively unimportant to spotted owls in aggregate. These sections may, however, be important to the maintenance or integrity of individual spotted owl management areas, and an inventory of these

sites should be done during the preparation of the California plan and reviewed for local importance.

## **Private Lands**

Private timberlands in California usually fall into one of three major categories: industrial lands, large private landholdings, and small private landholdings. These ownerships manage a total of 8,613,699 acres, or 53 percent of all forested lands in northwestern California (industrial lands 2,514,583 acres; large private landholdings 210,170 acres; and small private landholdings 5,888,916 acres). Lands designated primarily for timber production total 6,793,382 acres, of which 2,188,460 acres are industrial lands. From 10 to 15 percent of the industrial land base is unsuitable for timber harvest because of physiographic considerations, and production is constrained by regulations on an additional 10 percent of these areas.

The ISC Report (Thomas et al. 1990) estimated the following as current acreages of small and large saw timber on private lands within the range of the northern spotted owl in California (total = 2,170,000 acres): for stands ranging from 9 to 20.9 inches in d.b.h. – 658,000 acres in the northwestern area and 1,163,000 acres in the northern interior area and for stands greater than 21 inches in d.b.h. – 217,000 acres in the northwestern area and 132,000 acres in the northern interior area.

Of the 1,750,767 acres of industrial timberlands to be managed, the Technical Advisory Committee (Thomas et al. 1990) predicts that 700,307 acres will be in stands old enough to provide nesting, roosting, and foraging habitat at any one time. They assumed that all such habitat is capable of supporting spotted owls and used rotation ages for coastal areas of 50 to 60 years and inland areas of 80 to 90 years. Given these rotations, nesting, roosting, and foraging habitat would be produced in 25 to 35 years and 40 to 45 years in each area, respectively. Although some habitats in these age classes contain spotted owls, it is believed they underestimate the age at which habitats in these areas typically become suitable for most life requisites of spotted owls. More investigations of habitat use in the managed forests are warranted.

Using the same basic process, the Technical Advisory Committee (Thomas et al. 1990) predicted that 1,037,671 of 2,599,177 acres of timber-emphasis lands owned by small landowners will be spotted owl nesting, roosting, and foraging habitat at any one time.

An additional 1,844,240 acres not emphasized for timber production is owned by small, private landowners and by industry. These are lands dominated by hardwoods and not likely to be subject to intensive harvest in the future. The Technical Advisory Committee estimates



that about 1,475,392 acres of these lands should be nesting, roosting, and foraging habitat for spotted owls.

Private industrial forest habitat occurs regularly in larger blocks, aggregated for management purposes. Blocks, however, may be dispersed. Small, private forest lands also form large areas, but their ownership patterns are complex and parcel sizes are small.

A segment of the timber industry in California performed three major surveys and inventory efforts in the last 2 years. Spotted owls were located at 290 sites. Ninety-nine pairs were confirmed, and reproduction was documented at 36 sites. About 10 percent of all sites found duplicated sites previously known.

The Technical Advisory Committee (Thomas et al. 1990) believes that substantial nesting, roosting, and foraging habitat is now available and being used by spotted owls under past and current timber management practices on private lands, without any past attention having been given to habitat requirements of spotted owls. They predict no changes in land management that will decrease the amount of nesting, roosting, and foraging habitat. Part of the reasoning for this philosophy is based on the relatively small percentage of timber that is clearcut in inland areas, the presence of regulations and physiographic constraints on harvesting timber on more than 80 percent of the industrial land base, and the additional proportion of the land that will support nesting, roosting, and foraging habitat while attaining full rotation age.

### The Nature Conservancy

The Nature Conservancy manages two parcels of land with nesting, roosting, and foraging habitat in the range of the northern spotted owl in California. The Northern California Coast Range Preserve in northern Mendocino County contains about 6,500 acres of old-growth Douglas-fir in an 8,000 acre tract managed in about equal parts by the Nature Conservancy and the BLM. The second area, the McCloud River Preserve in north-central Shasta County, contains 2,300 acres of forests, with about 1,600 acres in old-growth Douglas-fir and mixed-conifer stands considered nesting, roosting, and foraging habitat. Habitat in both areas is fairly contiguous along major watercourses.

Three spotted owl pairs are known to occur in the Northern California Coast Range Preserve; two pairs are basically using Nature Conservancy land and one pair is using BLM land. Pairs have been found at all three known sites in the last 5 years, and two pairs have reproduced during that period. No spotted owls have been found at the McCloud River Preserve.



Management direction for both areas is to preserve their natural qualities, including the continued maintenance of old-growth Douglas-fir forests. At the Northern California Coast Range Preserve, management of the area also depends on the BLM. In the preferred alternative for this area, in the resource management plan for the Arcata Planning Area, the BLM will continue to manage their land as an Area of Critical Environmental Concern.

The future management of both areas will maintain spotted owl nesting, roosting, and foraging habitat. The Northern California Coast Range Preserve is relatively small and isolated from other big blocks of nesting, roosting, and foraging habitat, however, it will depend on the California Conservation Plan to provide other areas of nesting, roosting, and foraging habitat nearby and a population of spotted owls large enough to maintain itself through time. The McCloud River Preserve is adjacent to the Girard HCA, the major population center for spotted owls in the connecting zone between the ranges of the northern and California subspecies. It should continue to be maintained in a state suitable for use by spotted owls.

### **National Audubon Society**

The National Audubon Society manages a 1,000-acre tract of second-growth redwood forest in coastal Marin County. The area provides about 600 acres of nesting, roosting, and foraging habitat and maintains one pair of owls. Management direction is to manage the area for its natural values, including the redwood forest. This small area depends on adjacent National Park, State Park, and municipal water district lands to continue to support spotted owls. Management direction on these neighboring lands is generally consistent with maintaining spotted owl nesting, roosting, and foraging habitat. The area also is within the block of habitat that supports about 24 pairs of owls at the southern end of the spotted owl's range.

### **California Management Status**

Since the FWS listed the northern spotted owl as a Threatened species, the State of California has been managing northern spotted owl habitat on State and private lands to meet FWS guidelines (USDI 1990a). For any proposed project, the landowner must submit and have approved a Timber Harvest Plan. The intent of Timber Harvest Plans is to meet FWS guidelines (USDI 1990a). The Timber Harvest Plan process is only intended to remain in effect until a Habitat Conservation Plan is approved by the FWS.

The rules for Timber Harvest Plans require surveys and specific protection measures for all discovered spotted owls, or if no surveys are conducted, a broader habitat protection plan must be developed before

timber harvest can begin (State of California, Title 14 CCR, 1991). The FWS survey protocols are used to determine spotted owl presence and the FWS protocol for protecting habitat from take is used to model protection measures. Each plan is presented by State licensed foresters and reviewed and approved by State employed biologists who are trained for the task. Training and procedures are reviewed by the FWS. In addition to the Timber Harvest Plans, a larger habitat protection plan called the Spotted Owl Resource Plan, which uses site-specific information to develop protection measures, will allow harvest without taking spotted owls or diminishing habitat viability. The Spotted Owl Resource Plan necessarily involves more than one Timber Harvest Plan area.

The management strategy for known nest sites or activity centers are as follows:

1. Within 500 feet of the nest site or activity center, retain all structural integrity of the area. No timber harvest during the breeding season, February 15 to August 31. Some operations are permitted if supported by on-site conditions and shown to be accepted by the spotted owls.
2. Within 1,000 feet from the nest site or activity center, retain the structural components necessary for roosting and protection from predation and storms. A minimum of 50 percent dominant canopy and a hardwood component composed of mixed-aged trees should be retained. Of particular importance are older trees considered overmature. The distance should be adjusted to conform to natural landscape attributes such as draws and stream courses and be extended where necessary to connect with water protection zones and spotted owl activity centers.
3. Within 0.7 mile from the nest site or activity center, retain the structural components throughout the area necessary to support feeding requirements such as perch structures and prey animal needs. Retain at least 500 acres with a minimum 40 percent total canopy composed of mixed-age, mixed-species trees including hardwoods, particularly overmature trees in locations normally used by spotted owls. Less than 50 percent of the area should be under operation in 1 year.
4. Within 1.3 miles from the nest site or activity center, retain at least 1,336 acres with a minimum 40 percent total canopy composed of mixed-age, mixed-species trees including hardwoods, particularly overmature trees in locations normally used by spotted owls.

# D

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## Appendix D

### Annotated Bibliography



# Appendix D

## Annotated Bibliography

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### **Annotated Bibliography of Recent Research Information on Northern Spotted Owls**

This annotated bibliography contains references on selected scientific studies that have been published or are still unpublished since the ISC published its Conservation Strategy for the Northern Spotted Owl (Thomas et al. 1990). References contained within this bibliography became generally available between January 1990 and December 1991. Because additional studies may be in an unpublished form and therefore not readily available, it is probable that some literature relating to this subject and completed within the dates given were not included in these annotated bibliographies. Some of the unpublished literature is still in draft form and not ready for public distribution. The interdisciplinary team was permitted to review these drafts for the purpose of assessing new data since the ISC report. The drafts were returned to their sources.

This appendix is divided into two sections. The first section is a list of studies that have been published since the ISC Report. For published references, in addition to the literature citation, the abstract is included when available. In the second section, unpublished references available since completion of the ISC Report are listed. Annotations are included for some of the references listed in both sections.

The major conclusions of the ISC Report regarding spotted owl biology, demography and habitat use have not changed substantially after a review of the literature included here. Research on spotted owl habitat use, particularly for northern California and the east slope of the Washington Cascades should continue to add to the existing information. The review of new studies and the incorporation of information into habitat management planning should continue through accepted scientific research processes, including publication peer review.

Annotations are included for selected references. For annotations which come from author written abstracts, summaries, and conclusions, an index code of (A) is given at the end of the quote. For compiler generated annotations, an index code of (C) is found at the end of the paragraph.



## Published Literature

Anderson, D.R.; Bart, J.; Edwards, T.C., Jr. [and others]. 1990. 1990 Status review: northern spotted owl *Strix occidentalis caurina*. USDI Fish and Wildlife Service. 99 p.

"Although there appears to be wide variability in nesting substrate, nests were generally found in stands having a well-developed, multilayered canopy. Nest sites in Oregon and Washington were found almost exclusively in old-growth forests. One characteristic common to roost sites throughout the range of the northern spotted owl is a multilayered canopy. Home range size of paired owls varied from a low of 1,035 acres in the Klamath Province to a high of 30,961 acres in the Oregon Cascades. Percent median acres of old-growth and mature forest within a home range varied from 25% in the Oregon Coast Range to 74% in the Klamath Province. Owls selected old-growth for foraging more than would be expected if selection had been made at random. Data from habitat use versus availability studies clearly demonstrate that northern spotted owls select old-growth forest in the Oregon Coast Range, Oregon Cascades, Washington Cascades/Olympic Peninsula and Klamath Provinces. Throughout most or all of their range northern spotted owls are rare or absent in stands younger than currently projected rotation ages. Virtually no private land in Washington or Oregon contains suitable habitat for the owl."

"There are no estimates of the historical population size of the northern spotted owl, and few data on its historical distribution. Most of the present population is found in the southern portion of the Cascades in Washington, throughout the Cascades and Klamath Provinces in Oregon, and in the Klamath and Coast Range Provinces of northwestern California. Total population size is primarily a function of the total amount and distribution of suitable habitat available to sustain successfully reproducing pairs of owls through time. 1985-1989 observations total 2,030 pairs of owls."

"We have reviewed the status of the northern spotted owl and concluded that it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. ... It is thus entirely appropriate that a listing decision be made immediately. ..." (A)

Azuma, D.L.; Baldwin, J.A.; Noon, B.R. 1990. Estimating the occupancy of spotted owl habitat areas by sampling and adjusting for bias. Gen. Tech. Rep. PSW-124. Berkeley, CA: USDA Forest Service, Pacific Southwest Research Station. 9 p.

"A basic sampling scheme is proposed to estimate the proportion of sampled units (Spotted Owl Habitat Areas (SOHAs) or randomly sampled 1000-acre polygon areas (RSAs)) occupied by spotted owl pairs. A bias adjustment for the possibility of missing a pair given its presence on a SOHA or RSA is suggested. The sampling scheme is based on a fixed number of visits to a sample unit (a SOHA or RSA) in which the occupancy is to be determined. Once occupancy is determined, or the maximum number of visits is reached, the sampling is completed for that unit. The resulting data are summarized as a set of independent Bernoulli trials; a zero (no occupancy) or one (occupancy) is recorded for each unit. The occupancy proportion is the sum of these Bernoulli trials divided by the sample size. The bias adjustment estimates this occupancy proportion for the estimated number of units on which a pair of owls was present but not detected."

The bias adjustment requires the recording of the number of the visit during which occupancy was first detected. The distributional assumptions are checked with five different sets of data."

"There is some likelihood that a sample unit may be misclassified as unoccupied. To the extent that this occurs, estimates of the occupancy proportion would be negatively biased, and calculations of sample size would need to be adjusted. In this paper we proposed a bias adjustment based on the average number of visits to detect an owl pair, a variable that we assumed, followed a truncated geometric distribution. The assumptions of independence between visits and the constant probability of detection were critical for employing the bias adjustment. These assumptions made it possible to think collectively, about the six visits to a sample unit as a simple Bernoulli trial. A strict set of sampling protocols has been implemented (Spotted Owl Inventory and Monitoring Handbook, USDA 1988b) to make these assumptions as reasonable as possible. These protocols were used to estimate the average number of visits to first detection and an adjusted occupancy proportion for each of five independent sets of data. Using these data, no significant differences were found between the theoretical and empirical frequency distributions of first detections." (A)

Barrowclough, G. F.; Gutierrez, R.J. 1990. Genetic variation and differentiation in the spotted owl (*Strix occidentalis*). Auk. 107: 737-744.

"We used starch-gel electrophoresis to investigate genetic variability at 23 loci in 107 individuals from seven populations of the spotted owl (*Strix occidentalis*). These populations sample all three currently recognized subspecies. No genetic variation was found in six populations from Oregon and California. Average heterozygosity in owls from New Mexico was 0.022. The low level of genetic variability will make it more difficult to monitor the genetics of this threatened species; the paucity of variation is possibly due to a small overall effective populations size or bottlenecks in the past. At one locus there was a major allelic frequency difference between the Pacific Coast populations (*S. o. caurina* and *S. o. occidentalis*) and the allopatric taxon (*S. o. lucida*) found in New Mexico; our estimate of  $F_{ST}$  is 0.55. We believe the two allopatric populations have long been isolated, and it is probable that they represent two species. The data do not help elucidate the subspecific status of *S. o. caurina*. (Rec'd. 11 December 1989, accepted 11 May 1990)." (A)

Bart, J.; Forsman, E. D. [In press] (11/15/91). Dependence of northern spotted owls on old-growth forests. Biological Conservation.

"This effort was made to investigate owl abundance in young, regenerating forests, owl abundance and productivity on areas with <20% older forest, and whether currently protected older forest provides high quality habitat for northern spotted owls." (C)

Blakesley, J.A.; Franklin, A.B.; Gutierrez, R.J. 1990. Sexual dimorphism in northern spotted owls from northwestern California. J. Field Ornith. 61: 320-327.

"We measured weight, wing length, tail length, bill length, bill depth, and tarsus length and counted the number of complete tail bars of live adult and subadult Northern Spotted Owls (*Strix occidentalis caurina*). All variables showed significant differences between mean values for females and males ( $n = 65$  females,  $68$  males). There was no significant correlation between male and female sizes of mated spotted owl pairs for any measurement variable ( $n = 64$  pairs;  $57$  females and  $6$  males). We determined that weight was a better predictor of sex than the number of complete tail bars or any other measurement variable. Adding additional variables to weight in a discriminant analysis did not improve the original correct classification rate of  $90.2\%$ . Mean weights of female and male owls were  $663 \text{ g} \pm 42.8 \text{ (SD)}$  and  $579 \text{ g} \pm 34.9$ , respectively. Dimorphism Indices were highest for the cube root of weight ( $4.51$ ), tail length ( $3.30$ ) and wing length ( $2.47$ ). Determining sex of an owl in the field by the owl's vocalizations and behavior remains the most reliable sexing technique. Field measurements may be used to estimate the sex of a captured owl when behavioral cues are not available." (A)

Buchanan, J.B. 1991. Spotted owl nest site characteristics in mixed conifer forests of the eastern Cascade mountains, Washington. Seattle, WA: University of Washington, 125 p. M.S. Thesis.

"This study was undertaken to describe habitat characteristics associated with spotted owl (*Strix occidentalis*) nest sites in the mixed-conifer forests of the east slope of the Cascade Mountains, Washington. I fathered habitat data at 95 of the 102 known sites in the region, as well as at 62 paired random sites situated in stands that contained nest trees. Nest elevations ranged from 1250-4800 feet. Most nests were on the lower third of slopes, but nests were also found on other slope positions and on bottomland. The distribution of nest site aspects was random but differed significantly from the aspect of random sites. Various types of natural disturbances, such as fire, root rot, and mistletoe infection, had occurred at many nest sites. In addition,  $46\%$  of the stands had been partially harvested at least 40 years prior to this study." (A)

Call, D. 1990. Home range and habitat use by California spotted owls in the central Sierra Nevada. Arcata, CA: Humboldt State University. 97 p. M.S. Thesis.

Carey, A. B.; Horton, S. P. [In Press](July 1991). Spotted owl habitat: influence of biotic region and landscape character. Ecol. Monogr. 25 p. typescript.

"Objectives: To determine the influence of biotic region and landscape composition within biotic regions on spotted owl home range size, the amount of old growth in home ranges, and habitat selection in a narrow ( $100 \text{ km}$ ) latitudinal belt in southwestern Oregon." (A)

Carey, A.B.; Hardt, M.; Horton, S.P. [and others]. 1991. Spring bird communities in the Oregon Coast Range. In: Ruggiero, L.F.; Aubry, K.B.; Carey, A.B., Huff, M.H. tech. coords., eds. 1991. Wildlife and vegetation of unmanaged douglas-fir forests. Proceedings of a symposium, 1989 March 29-31: Portland, OR. Gen. Tech. Rpt. PNW-GTR-285. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 533 p.



"Objectives were to determine the value to birds of old-growth forests relative to mature and young forests in the southern Oregon Coast Ranges. Special emphasis was placed on cavity-using birds." (C)

Chasan, D.J. 1990. Whose ancient forest? Defenders. Sep/Oct: 15-35.

A broad ranging article which follows the spotted owl/old-growth controversy beginning with a quote by Stuart Chase in 1939 that "not more than one tenth of the old virgin [northwest] forest remains..." and continues through economic, political, and biological arguments through the ICS (Thomas) Report and the Hatfield-Adams amendment to an appropriations bill in which Congress allowed sales of contested timber sales to proceed through that fiscal year.

The article concentrates on protection for the spotted owl, discusses economic impacts to local communities, identifies values for old-growth in addition to timber harvest, discusses advantages and disadvantages of banning log exports, notes the decline of employment in the wood-products industry due to improved technology, discusses inevitable future reductions in employment and revenues even if the owl is not protected, and discusses problems associated with an Endangered Species Act which focuses legal, economic, and political attention on individual species rather than on eco-system viability. The last point is emphasized by quoting Gordon Orians, acting director of the University of Washington's Institute for Environmental Studies as saying, "We all know it's not the owl. What disturbs me is the failure of the media to explain to the public that it isn't owls versus jobs." (A)

Fitton, S. 1991. Vocal learning and structure of male northern spotted owls in northwestern California. Arcata, CA: Humboldt State University. M.S. Thesis.

Forsman, E. D. 1988. A survey of spotted owls in young forests in the northern coast range of Oregon. Murrelet: 69: 65-68.

Ganey, J.L. 1990. Calling behavior of spotted owls in northern Arizona. Condor. 92(2): 485-490.

"I studied the calling behavior of radio-tagged Mexican Spotted Owls (*Strix occidentalis lucida*) in northern Arizona. Owls used a variety of calls, with three call types (Four-note Location Call, Contact Call, and Bark Series) accounting for 86% of calling bouts heard. These calls were used by both sexes, but in significantly different proportions. Males ( $n = 4$ ) called twice as frequently as females ( $n = 3$ ), and there also appeared to be intrasexual differences in calling rates. Calling activity increased from March through May, then declined from June through November. Calling activity was highest during the 2-hr period following sunset, with smaller peaks 4-8 hr after sunset and just before sunrise. Calling bouts averaged 9.9 min in duration, and were significantly longer when other owls were calling. Owls called more than expected during the last quarter and new moon phases of the lunar cycle, and called most frequently on calm, clear nights when no precipitation was falling. The timing and nature of Spotted Owl calls suggests that calling behavior may be as important in intrapair communication as in territory advertisement. Differences in calling rates among owls suggest that not all owls will be equally detectable using calling surveys." (A)

## Appendix D

Ganey, J. L.; Balda, R. P. 1989. Home-range characteristics of spotted owls in northern Arizona. *J. Wildl. Manage.* 53(4): 1159-1165.

"We studied home-range characteristics and movements of Mexican spotted owls (*Strix occidentalis lucida*) in northern Arizona. Mean home-range size was 648 ha for 8 individuals and 847 ha for 3 mated pairs. Pair home ranges contained a mean of 403 ha of old-growth forest. Home-range size was positively correlated with elevation, amount of old-growth forest, and percentage of old-growth forest within the home range. Topography did not directly constrain home-range size, but did influence location of activity centers; i.e., areas that received heavy and repeated use by owls. All owls had activity centers located in old-growth forests on steep slopes, and visited other portions of the home range infrequently. On average, 60 and 80% of individual locations fell within only 21 and 47%, respectively, of a home range. Two owls left the study area from November to April and > 3 others remained on or near their summer range throughout the year. Owls showed seasonal shifts in use areas with the net result that year-round home ranges were larger than the areas used during any 1 season." (A)

Ganey, J. L.; Balda, R. P. 1989. Distribution and habitat use of Mexican spotted owls in Arizona. *Condor*. 91: 355-361.

"Distribution and habitat use of Mexican Spotted Owls (*Strix occidentalis lucida*) in Arizona were studied from 1984-1988. Owls were widely but patchily distributed throughout the state except for the arid southwestern portion. Distribution of the owl corresponded with distribution of forested mountains and canyonlands within the state. Owls occurred either in rocky canyons or in any of several forest types, and were most common where unlogged closed canopy (>80%) forests occurred in steep canyons. Several forest types provided these habitat characteristics in southern Arizona, and owls occurred in all of them. Only unlogged mixed-conifer forest provided these characteristics in northern Arizona, and most owls (67%) were found in this forest type in northern Arizona. Many owls in northern Arizona (54%) were located in areas where timber harvest was either occurring now or was planned in the next 5 years. Owls could not be located at 27% of the historic sites resurveyed, indicating that population levels may have declined in Arizona." (A)

Gov't., U.S. 1990 (June 26). Endangered and threatened wildlife and plants: determination of threatened status for the northern spotted owl. *Federal Register*. 55(123): 26114-26194. Part IV, USDI Fish and Wildlife Service, 50 CFR Part 17.

"This document provides a synopsis of northern spotted owl (*Strix occidentalis caurina*) biology, contains extensive documentation of comments made in response to issues at hearings, summarizes the factors affecting the species, provides for the designation of critical habitat within two years, and discusses available conservation measures. Effective date: July 23, 1990."

"The U. S. Fish and Wildlife Service determines the northern spotted owl to be a threatened species pursuant to the Endangered Species Act of 1973, as amended. The present range of the subspecies is from southwestern British Columbia through western Washington, western Oregon, and the Coast Range area of northwestern California south



to San Francisco Bay. The northern spotted owl is threatened throughout its range by the loss and adverse modification of suitable habitat as the result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and wind storms. Northern spotted owls primarily occur in old-growth and mature forest habitats, but may also be found in younger forests that possess the appropriate structural and vegetational attributes, with attendant prey populations. The rule extends the [Endangered Species] Act's protection to the northern spotted owl." (A)

Gov't., U.S. 1991 (May 6). Endangered and threatened wildlife and plants: proposed determination of critical habitat for the northern spotted owl. Federal Register. 56(87): 20816-21016. 201 p.

"On 4 April 1990 the Interagency Scientific Committee(ISC) released "A Conservation Strategy for the Northern Spotted Owl " (Plan). The ISC plan was prepared before the owl was listed and did not explicitly address "recovery," "critical habitat," or any other aspect of the Endangered Species Act. On 8 August 1990, the BLM released its management plan entitled "Northern Spotted Owl: The Jamison Plan Detailed Management Strategy " (Jamison Plan) which provides interim guidance prior to the development of Resource Management Plans. The Jamison plan incorporates the system of Habitat Conservation Areas (HCAs) recommended by the ISC plan as well as other areas that contain habitat elements upon which owls depend that are similarly in need of special management considerations or protection. The designation of critical habitat, however, does not prescribe any particular management regime in the areas so designated. Rather, it identifies areas within which interagency consultation under section 7 of the Act will address any potential loss of resources that could appreciably diminish the capability of that habitat to contribute to the survival and recovery of the species. Because HCAs and the areas proposed as critical habitat are defined according to different criteria and serve different purposes, they should not be expected to coincide exactly. However, the Service used the HCA network as a basis for identifying critical habitat. The approximate total acreage of proposed Critical Habitat Areas (CHAs) for the northern spotted owl = 11,639,195 acres, 5,099,180 acres in Oregon, 3,257,945 acres in California, and 3,261,070 acres in Washington."

"Each proposed project within a CHA would be examined in relation to its site-specific impacts. Thus, projects such as commercial thinning of timber stands and other selective harvest prescriptions may or may not destroy or adversely modify critical habitat." (A)

The remainder of this document consists of maps and legal descriptions of the proposed Critical Habitat Areas. (C)

The USDI Fish and Wildlife Service proposes to designate critical habitat for the northern spotted owl (*Strix occidentalis caurina*), a subspecies federally listed as threatened under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act). The northern spotted owl, referred to herein as spotted owl or owl, is a medium-sized owl with dark eyes, dark-to-chestnut brown coloring, whitish spots on the head and neck, and white mottling on the abdomen and breast. The current range of the northern spotted owl extends from southwestern British Columbia through western Washington, western Oregon, and the Coast Ranges area of

## Appendix D

northwestern California south to San Francisco Bay. Located primarily on Federal land, and to a lesser extent on State and private lands, this proposed critical habitat designation would result in additional protection requirements under section 7 of the Act with regard to activities that require Federal agency action. Section 4 of the Endangered Species Act requires the Service to consider economic costs and benefits prior to making a final decision on the size and scope of critical habitat. The Service solicits data and comments from the public on all aspects of this proposal, including additional data on the economic impacts of the designation and a valuation technique for determining benefits. (C)

Guetterman, J.H.; Burns, J.A.; Reid, J.A. [and others]. 1991. Radio telemetry methods for studying spotted owls in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-272. Portland, OR: USDA Forest Service. 43 p.

The paper is a practical guide to field methodology for conducting a radio telemetry study of spotted owls (*Strix occidentalis*) in mountainous terrain. It begins with a synopsis of spotted owl biology and basic telemetry. The criteria used to select which owls will carry transmitters are discussed as are location and capture methods. Instructions for attaching transmitters and recommendations for general, night, and aerial telemetry are presented. Suggestions are given for controlling data quality, for researcher training and safety, and for field interpretation of radio signals. Equipment needs and license and permit requirements are also discussed.

Radio telemetry is used to estimate home range, to determine types of habitat used, the relation between the mix of habitat types and total home range size, regional variation in home range size, breeding behavior, intraspecific and interspecific interactions, and temporal and spatial movements of owls. Fifty-two publications cited. Twenty-two radio telemetry equipment suppliers listed. (C)

Gutierrez, R.J. 1989. Hematozoa from the spotted owl. J. of Wildlife Diseases. 25(4): 614-618.

"One hundred five spotted owls (*Strix occidentalis*) from seven populations and three subspecies were examined for hematozoa. *Haemoproteus noctuae*, *H. syrnii*, *Leucocytozoon ziemani*, *Trypanosoma avium*, *Atoxoplasma* sp. and unidentified microfilariae were recorded. All northern (*S. occidentalis caurina*), California (*S. occidentalis occidentalis*) and Mexican (*S. occidentalis lucida*) spotted owls were infected with at least one hematozoan; 79% had multiple infections. Twenty-two percent of the owls were infected with as many as four species of parasites. There were significant differences in the prevalence of these species of parasites occurring among the five populations of northern and California spotted owls sampled in California. *Haemoproteus noctuae*, *H. syrnii* and *Atoxoplasma* sp. represented new host records for this host species." (A)

Gutierrez, R.J.; Pritchard, J. 1990. Distribution, density, and age structure of spotted owls on two southern California habitat islands. Condor. 92(2): 491-495.

"We estimated the distribution and density of California Spotted Owls (*Strix occidentalis occidentalis*) occurring on Mt. San Jacinto during 1988 and 1989 and

on Palomar Mountain during 1988, southern California. Spotted Owls on Mt. San Jacinto were well distributed above 1,000 m in forested habitats. In contrast, owl distribution appeared to be affected by recent fires on Palomar Mountain. Densities on Mt. San Jacinto were estimated to be 0.16 owls/km<sup>2</sup> in 1988 and 0.19 owls/km<sup>2</sup> in 1989. The density estimate for Palomar Mountain was 0.64 owls/km<sup>2</sup>. The proportion of subadults in both of these isolated populations was over twice that reported for large contiguous populations of Spotted Owls which suggested a higher adult mortality in the insular populations. The fecundity of these insular populations was either lower than or similar to the northern spotted owl (*S. occidentalis caurina*).” (A)

Interagency Scientific Committee. 1991. An owl conservation strategy that works. J. Forestry. 89(8):23-26.

Laymon, S. A. 1989. Altitudinal migration movements of spotted owls in the Sierra Nevada, California. Condor. 91: 837-841.

“In this study, I documented a previously unknown, downslope, fall migration in 10 adult Spotted Owls (*Strix occidentalis*) in the central Sierra Nevada, California. The owls began to migrate in mid-October and all had migrated by mid-November. They moved an average of 31 km to the southwest and dropped an average of 754 m in elevation. This migratory movement enabled the owls to establish disjunct winter home ranges below the level of heavy and persistent snow. This seasonal movement complicates the task faced by land management agencies attempting to manage a viable population.” (A)

Laymon, S.A. 1991. Diurnal foraging by spotted owls. Wilson Bulletin. 103(1): 138-140.

Forsman (Forsman, et al. Distribution and biology of the spotted owl in Oregon, Wildlife Monograph. 1984) observed very little diurnal foraging during their studies of spotted owls in Oregon, concluding that few diurnal foraging bouts observed were opportunistic, and they suggested that other observations of diurnal foraging may also be of opportunistic foraging. This author found that spotted owls in the Sierra Nevada captured more diurnal prey and regularly foraged diurnally to feed their young during the first six weeks following fledging. Also, adults whose young were killed by predators stopped diurnal foraging and limited themselves to nocturnal foraging. Non-breeding owls were not observed foraging diurnally. The author speculates that “it is likely that diurnal foraging is a reaction to food stress placed on the adult spotted owl by rearing young. It is also possible that only pairs that commit to intensive diurnal foraging are able to raise young in the disturbed environment where this study was done. Spotted owls in less disturbed areas, with more abundant preferred nocturnal prey, might not forage diurnally during the breeding season.” (C)

Max, T.A.; Souter, R.A.; O’Halloran, K.A. 1990. Statistical estimators for monitoring spotted owls in Oregon and Washington in 1987. Res. Pap. PNW-RP-420. Portland, OR: USDA Forest Service, Pacific Northwest Region. 13 p.



"Spotted owls (*Strix occidentalis*) were monitored on 11 National Forests in the Pacific Northwest Region of the USDA Forest Service between March and August of 1987. The basic intent of monitoring was to provide estimates of occupancy and reproduction rates for pairs of spotted owls. This paper documents the technical details of the effort. All relevant formulae are presented as well as decisions made about collapsing strata to estimate variances. Some complicating aspects of the monitoring effort are also discussed." (A)

Moen, C.; Franklin, A.B.; Gutierrez, R.J. 1991. Age determination of subadult northern spotted owls in northwest California. *Wildl. Soc. Bull.* 19: 489-493.

"While banding and observing spotted owls as part of a long-term population study in northwestern California, we observed variation among subadult spotted owls with respect to the presence or absence of an acuminate lower margin on the white, triangular rectrix tips. Therefore, we examined the cretrices of the subadult age-class to determine if rectrix appearance could be used to separate the first 2 years of the subadult age-class. The observation period was 1 April through 31 August, 1984-1990 and involved 54 individuals, 22 of them for up to 3 years." (A)

Murphy, D.D.; Noon, B.R. 1992 [In press]. Integrating scientific methods with habitat conservation planning: reserve design for the northern spotted owl. *Ecological Applications*. 2(1): 4363-4378.

"To meet the requirements of Congressional legislation mandating the production of a "scientifically credible" conservation strategy for the threatened Northern Spotted Owl (*Strix occidentalis caurina*), the Interagency Spotted Owl Scientific Committee employed scientific methods to design a habitat reserve system. Information on the current and historical distributions of the owl and its habitats was reviewed in light of economic, political, and legal constraints; results were used to develop a preliminary reserve system of habitat "polygons." A map representing these polygons and their attendant properties served as a set of hypotheses that were tested. Statistical analyses of empirical data, predictions from ecological theory, predictions from population dynamics models, and inferences drawn from studies of related species were used to test properties of the preliminary map, including the number and sizes of habitat conservation areas (HCAs), their distribution, configuration, and spacing, and the nature of the landscape matrix between HCAs. Conclusions that failed to confirm specific map properties were used to refine the reserve system, a process that continued iteratively until all relevant data had been examined and all map properties had been tested. This conservation planning process has proven to be credible, repeatable, and scientifically defensible, and should serve as a model for wildlife management, endangered species recovery, and national forest planning." (A)

Noon, B.R.; Biles, C.M. 1990. Mathematical demography of the spotted owl in the Pacific Northwest. *J. Wildl. Manage.* 54(1): 18-27.

"We examined the mathematical demography of northern spotted owls (*Strix occidentalis caurina*) using simple deterministic population models. Our goals were to

gain insights into the life history strategy, to determine demographic attributes most affecting changes in population size, and to provide guidelines for effective management of spotted owl populations. The spotted owl apparently has evolved high adult survival rates associated with irregular and unpredictable reproduction. The finite rate of population change in this subspecies is most sensitive to variation in adult survival rate and relatively insensitive to variation in fecundity and age at first reproduction. However, rates of population change are strongly affected by reproductive senescence if it occurs before 15 years of age. Sound management practices should include efforts to control factors that adversely affect the survival rate of adult females."

"Given the spotted owl's life history structure, an evaluation of management decisions in terms of persistence likelihoods is only possible when viewed over the long term (50-100 yr). With its very high adult survival probability and apparent longevity, the species may be able to persist over the short term even in the face of extensive reductions in the amount of suitable habitat. There may be a significant time lag in the response of spotted owl population size to decreases in environmental carrying capacity. As the northern spotted owl increasingly takes on a metapopulation structure due to habitat fragmentation, the uncertainty of successful dispersal will become progressively more relevant to the subspecies' long-term population dynamics and likelihood of persistence." (A)

Randi, E.; Fusco, G.; Lorenzini, R.; Spina, F. 1991. Allozyme divergence and phylogenetic relationships within the Strigiformes. *Condor*. 93: 295-301.

Raphael, M. G.. 1990. Mammals of the ancient forests. p. 95-100 in Norse, E. A., ed. 1990. *Ancient Forests of the Pacific Northwest*. Washington, D.C.: Island Press. 270 p.

This is a characterization of the state of knowledge of unique habitat values used by mammals in the ancient forests of western Oregon and Washington. (C)

Ripple, W.J.; Johnson, D.H.; Hershey, K.T.; Meslow, E.C. 1991(June). Old-growth and mature forests near spotted owl nests in western Oregon. *J. Wildl. Manage.* 55(2): 316-318.

"We investigated how the amount of old-growth and mature forest influences the selection of nest sites by northern spotted owls (*Strix occidentalis caurina*) in the Central Cascade Mountains of Oregon. We used 7 different plot sizes to compare the proportion of mature and old-growth forest between 30 nest sites and 30 random sites. The proportion of old-growth and mature forest was significantly greater at nest sites than at random sites for all plot sizes ( $P < 0.01$ ). Thus, management of the spotted owl might require setting the percentage of old-growth and mature forest retained from harvesting at least 1 standard deviation above the mean for the 30 nest sites we examined." (A)



## Appendix D

Rubin, J.; Helfand, G.; Loomis, J. 1991. A benefit-cost analysis of the northern spotted owl. *J. Forestry*. 89: 25-30.

Simberloff, D. 1987. The spotted owl fracas: mixing academic, applied, and political ecology. *Ecology*. 68(4): 766-779.

"Recent intensive field study and modelling of the Spotted Owl foster optimism that scientists can help solve problems in managing threatened species and can cooperate with government agencies to stem the decline of biotic diversity. The effort shows that field biologists can quickly conduct coordinated research on a species whose habits make it difficult to study, and that modellers can quickly use field data to refine questions and to predict effects of potential management strategies. However, the key empirical finding— that the Owl's home range typically encompasses huge amounts of old-growth forest— has generated enormous unease among forest industry interests. They do not relish the prospect that the United States Department of Agriculture Forest Service will sequester thousands of acres of forest with timber worth thousands of dollars per acre. The Forest Service, in its tentative plan for managing the Spotted Owl, seems to have taken a middle course. Their preferred alternative includes substantially fewer and smaller sites than are recommended by an advisory panel formed by the major ornithological societies. However, this plan includes much more old growth than the previous one does. Should this plan be enacted, the small chance for long-term survival of the Spotted Owl will require increased adherence by individual forests to the spirit as well as the letter of the plan." (A)

Sisco, C.L. 1990. Seasonal home range and habitat ecology of spotted owls in northwestern California. Arcata, CA: Humboldt State University. 81 p. M.S. Thesis.

"Seasonal home range use and habitat ecology of the Northern Spotted Owl (*Strix occidentalis*) were studied using radio-telemetry from October 1981 until March 1984 in northwestern California. A total of 18 individuals were radio-tagged and monitored for periods ranging from 11 to 151 days over a 3 year period. Home range estimates for 15 individuals and habitat use for 11 spotted owls were analyzed from 3,371 tracking locations between winter and summer forage/roost sites." (A)

Solis, D.M., Jr.; Gutierrez, R.J. 1990. Summer habitat ecology of northern spotted owls in northwestern California. *Condor*. 92: 739-748.

"We studied the summer habitat ecology of 12 northern spotted owls (*Strix occidentalis caurina*) in two areas of northwestern California. Spotted Owls used mature or old-growth conifer forests significantly more than expected relative to their availability within their home ranges. In contrast, spotted owls used forests of intermediate and young age significantly less than expected relative to their availability within their home ranges. Eighty-four percent of 616 spotted owl radiotelemetry locations were recorded in mature or old-growth forests. Spotted owls used forests of complex structure and old age. There were significant differences in habitat structure (e.g., canopy closure, shrub cover, herb cover, old-growth conifer basal area, and hardwood tree density) among habitats used for frequent foraging, infrequent foraging, and roosting. In addition, male and female owls appeared to select habitats with different structure for foraging. Male

owls which are smaller than female owls foraged in habitats which had higher tree density than female owls. The mean summer home-range size was 413 ha (SD = + 196 ha) with males having smaller mean home-range size than females (338 ha and 538 ha, respectively)." (A)

Thomas, J.W.; Forsman, E.D.; Lint, J.B.; Meslow, E.C.; Noon, B.R.; Verner, J. 1990. A conservation strategy for the northern spotted owl. Interagency Scientific Committee to address the conservation of the northern spotted owl. Portland, OR: USDA Forest Service; USDI Bureau of Land Management, Fish and Wildlife Service, National Park Service. U.S. Gov't. Printing Office. 427 p.

USDA Forest Service. 1991. Questions and answers on a conservation strategy for the northern spotted owl. Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 63 p.

These questions and answers are intended to help clarify *A Conservation Strategy for the Northern Spotted Owl: Report of the Interagency Scientific Committee To Address the Conservation of the Northern Spotted Owl*, published in May 1990, in Portland, Oregon. The U.S. Senate Committee on Energy and Natural Resources held a hearing on 31 May 1990 in which written questions were posed by four senators and by senators on behalf of other senators, governors, industry councils, and agencies. Because the responses help explain many facets of the conservation strategy, the ISC believes that a general distribution of these questions and answers would benefit managers of resource agencies, biologists, and others interested in the strategy.

The questions covered aspects of owl biology, evidence of declining populations in relationship to habitat fragmentation from logging and from natural phenomenon, accuracy of inventories, differences in habitat used by owls in different areas throughout their range, effects of fire and/or fire suppression, statistical accuracy, economic effects, and credibility of the owl report and the science involved.

The answers were generally based on information gathered in the process of preparing the spotted owl report and presented in a manner to respond to the specific questions. The information presented was consistent with the information, conclusions, and recommendations contained in the spotted owl report. (C)

USDA Forest Service. 1990. Forest Service report to the Congress: implementation of Section 318 of the Interior and Related Agencies Appropriation Act for Fiscal Year 1990; sixth report. Washington, D.C.: USDA Forest Service. 28 p.

"Section 318 of the fiscal year 1990 Appropriations Act for the Interior and related agencies requires the Forest Service to submit monthly reports to the Congress. This is the sixth account of the implementation of Section 318, which set timber harvest objectives for Region 6 and prescribed measures for protecting the northern spotted owl and old-growth forests."

## Appendix D

"As of April 20, 1990 the National Forests in Region 6 received bids or awarded sales for 3.9 billion board feet of timber. In addition, 253 million board feet are advertised for sale. As the snow recedes, the pace of advertising sales will quicken."

"Five of the 13 citizen advisory boards created to help implement Section 318 have essentially completed their work. Eight are in various stages of completion and are expected to finish by mid-June. Eighty percent of the fiscal year 1990 timber sale volume has been presented to the boards and recommendations have been made on 70 percent."

"The Interagency Scientific Committee (ISC) has completed its work and submitted a report to the agency heads who chartered the group. The report has been widely publicized and a summary is included in an appendix to this report."

"The U.S. Fish and Wildlife Service (FWS) has completed its analysis of the potential effects of Section 318 timber sales on the northern spotted owl. It has prepared an informal conference report that provides advisory recommendations for reducing or minimizing these effects."

"The appeals of 45 timber sale decisions were in the office of the Regional Forester for review on April 17. The total volume affected was 359 million board feet (MMBF). Of this total, 319 MMBF is planned for sale in fiscal year 1990, 259 MMBF of it on Forests occupied by the northern spotted owl." (A)

USDI Fish and Wildlife Service. 1990. Interim procedures leading to endangered species act compliance for the northern spotted owl. Portland, OR: USDI Fish and Wildlife Service, Region 1. 37 p.

Includes formal Section 7 consultation guidance, interim recovery strategy, conservation planning for non-federal actions, and guidance for incidental take.

"Disclaimer: This copy of the procedures leading to Endangered Species Act compliance was prepared as instructional material to respond to questions about Endangered Species Act procedures that may apply when the northern spotted owl becomes a listed species."

For timber harvest activities, the "may effect" standard applies to harvest activities within suitable owl habitat, as well as any harvest activities within a 1/2-mile radius of any known nest site or pair activity center. Incidental take also applies to timber harvest activities which may harm or harass owls. Take or incidental take requires authorization. The Service will consider all requests for incidental take as appropriate; incidental take resulting from not following the guidelines will be investigated. Non-federal entities can apply for an incidental take permit by submitting an application and a habitat conservation plan to the Service. Because States authorize private timber harvest, they may be party to take on private lands, as well as on State lands. In the absence of an incidental take permit, this take would be a violation of the Endangered Species Act. Either individual land-owners or States may prepare habitat conservation plans, but the Service would prefer that States prepare such for all state and private timber lands. A "may effect" determination results in formal consultation. Each federal action "package" will result in a separate biological opinion issued by the Service to the Forest Service or



BLM. If the Service follows the normal procedure for producing a recovery plan, it is anticipated that two years would be required to prepare a finalized plan. (C)

USDI Fish and Wildlife Service. 1991. Guidelines for surveying proposed management activities that may impact northern spotted owls. Portland, OR: USDI Fish and Wildlife Service, Region 1. 22 p.

The(se) guidelines were designed to be followed when surveying areas where timber harvest activities may remove or modify northern spotted owl habitat. The U.S. Fish and Wildlife Service (Service) endorses the use of these guidelines for gathering information on proposed timber sale activities so that compliance with the "take" prohibition of the Endangered Species Act may be assured. Note that any information on owl presence within and/or adjacent to the proposed planning or activity areas is important, even if it does not meet the guidelines described below. However, if the only information available for a particular activity was acquired through less intensive surveys, the Service must conservatively assess the effects of the action on northern spotted owls. It is always useful to document reasons for not adhering to the recommended guidelines. (C)

"The enclosed guidelines only cover the technical aspects of conducting spotted owl surveys. These guidelines are based on several existing protocols and, when implemented, should serve two primary purposes: (1) provide adequate coverage and assessment of the area for the presence of spotted owls, and (2) ensure a high probability of locating spotted owls and identifying owl territories that may be affected by a proposed management action. It is not appropriate to use these guidelines to monitor yearly trends of spotted owls or for many other research applications."

"These guidelines were peer-reviewed by scientists, biologists, and managers who work on various issues pertinent to the ecology and management of northern spotted owls."  
(A)

Ward, J.P. 1990. Spotted owl reproduction, diet and prey abundance in northwest California. Arcata, CA: Humboldt State University. 70 p. M.S. thesis.

"I examined reproduction and diet of the northern spotted owl (*Strix occidentalis caurina*) and the patterns of abundance of its prey near Dinsmore, California, June through August 1987 and 1988. Relative abundance of deer mice (*Peromyscus* sp.), voles (*Microtus* sp. and *Clethrionomys californicus*), and insectivores (*Sorex*, *Neurotrichus*, *Scapanus* sp.), dusky-footed woodrats (*Neotoma fuscipes*), and northern flying squirrels (*Glaucomys sabrinus*) were not significantly different between home ranges of reproductively successful and unsuccessful male owls. However, true differences may not have been detected because a high variance in prey abundance within owl home ranges resulted in low power ( $< 0.10$ ) of performed comparisons."

"Woodrat abundance was more consistent among home ranges where owls successfully bred. This pattern did not follow with mice or insectivores. Relative abundance of woodrats and mice were significantly greater than expected at sites where spotted owls hunted, whereas abundance of Allen's chipmunks (*Tamias senex*), a species usually not

eaten by owls, was not. Woodrats comprised the greatest proportion of prey biomass consumed by northern spotted owls ( $X = 70.9\%$ ;  $sd = 13.4\%$ ) based on an analysis of 339 pellets collected from 9 owl home ranges."

"I concluded that dusky-footed woodrats are the predominant food resource for spotted owls in northwestern California during summer months. Moreover, these prey are distributed patchily, even in home ranges of reproductively successful owls. I suggest that some owls may compensate for this distribution by foraging at edge-sites abundant with woodrats." (A)

Ward, J.P., Jr.; Franklin, A.B.; Gutierrez, R.J. 1990. Using search time and regression to estimate abundance of territorial spotted owls. *Ecological Applications*. 1(2): 207-214.

"Using conventional sampling methods, unbiased, precise estimates of the number of individuals in a population can be difficult to obtain for rare, secretive species. We used a Leslie regression model (LRM) to estimate the number ( $N_0$ ) and the variance of the number ( $V[N_0]$ ) of adult and subadult northern spotted owls in a territorial population from direct counts within a 292 km<sup>2</sup> study area. Estimates of  $N_0$  from day counts were more accurate and precise and more robust to fluctuations in survey effort than estimates from night counts. LRM estimates from day counts were not significantly different from two different maximum-likelihood estimates, and required 30-64% less effort. These findings suggest a less costly method for statistically comparing spotted owl abundance between spatial or temporal units." (A)

Wilcove, D.; Murphy, D. 1991. The spotted owl controversy and conservation biology. *Conservation Biology*. 5(3): 261-262.

Wood, G.W. 1991. Owl conservation strategy flawed. *J. Forestry*. Feb: 39-41.

"The preparation of *A Conservation Strategy for the Northern Spotted Owl* may well have been the most concerted and intensive effort in the history of American wildlife management. Federal agencies, spurred by their increasing embroilment in the issues of loss of old-growth forest, declining northern spotted owl populations, the imminent listing of the owl as a threatened species and the spotted owl as a surrogate for old-growth, initiated a blitzkrieg strategy aimed at defusing the crisis before another episode of "courtroom land management" could begin. To that end, they appear to have been highly successful."

"My first two concerns are outside the committee's assigned responsibility. The ISC was to develop the best practicable strategy that would ensure a viable population of spotted owls for at least 100 years. It was not to consider ecological and economic tradeoffs or benefits resulting from that strategy."

"My second point concerns the old-growth/owl/logging issue. While the ISC recognized that "to some degree" the spotted owl is a surrogate for old-growth, it denied complicity with the surrogate process."



"There are some other ISC propositions that are of debatable scientific merit: cutting may result in an edge effect manifested by greater predation of spotted owls by barred and great horned owls; cutting negatively affects the prey base of spotted owls; old-growth forest conditions are a requirement for the northern flying squirrel; logging one stand critically predisposes an adjacent stand to blowdown; owl-pair cluster size will respond sluggishly to increases in HCA; etc. . . . It bodes ill as a guide to future management of the forests upon which society depends for a broad array of resources." (A)

## Unpublished Literature

Agee, J. K.; Edmonds, R. L. 1991 (August). [Draft]. Forest protection issues for the northern spotted owl. 90 p.

Anderson, D.R.; Burnham, K.P. [ca. 1991]. [Draft ms.]. Estimated rates of population change in the northern spotted owl. 11 p.

Anthony, R.G.; Rosenberg, D.; Brown, M. [and others]. 1990 (October). [Annual Report]. Patterns of distribution and abundance of small mammals in old- and second-growth Douglas-fir forests in the Oregon Cascades. p. 3-5. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.

"Compare small mammal abundance in old- and second-growth Douglas-fir forests, particularly the primary prey species of the spotted owl, compare the structural features of the habitat relating to differences in small mammal abundance within and among stands, relate owl reproduction to prey abundance, collaborate with other researchers in the spotted owl RD&A Program in synthesizing the results of the owl prey ecology studies across the Pacific Northwest." (A)

Baldwin, J. 1991 (February 15). [Unpublished]. Statistical review of manuscript "visit analysis". Berkeley, CA: USDA Forest Service Pacific Southwest Experiment Station. 37 p.

"To review, statistically, the protocols of establishing the occupancy/non-occupancy of spotted owl sites." (A)

Bingham, B.B. 1991 (May). [Draft ms.]. Stand level characteristics of spotted owl habitats on the Mad River Ranger District in California. Arcata, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. 7 p.

Characterization of the vegetation structure and composition, and the physiography of forest stands and landscapes used by the spotted owl. The research is being conducted within four study areas; Mad River, Ukonom (Tibar), Chetco, and Lassen. (C)

## Appendix D

Carey, A.B.; Forsman, E.D.; Maguire, C.C. 1990 (October). [Annual Report]. Patterns of spotted owl prey abundance in the Oregon Coast Range and Olympic Peninsula. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.

Carey, A.B.; Horton, S.P.; Biswell, B.L. 1991. [Draft ms.]. Northern spotted owls: influence of prey base and landscape character. 99 p.

Prey populations and the use and composition of home ranges of northern spotted owls (*Strix occidentalis caurina*) were studied in 5 landscapes in 2 forest types in southwestern Oregon. The landscapes differed in the degree to which old forest had been fragmented by wildfire and logging. Prey populations were measured at 47 sites in southwestern Oregon. Further data on prey populations were gathered on 14 sites on the Olympic Peninsula in northern Washington, where owls use larger ranges than in Oregon. (C)

Diller, L. 1989. [Unpublished report]. Status of the northern spotted owl in managed forests on Simpson Redwood lands in northern California. Arcata, CA: Simpson Timber Company.

Duncan, N.; Allbritten, M.; Briggs, M. [n.d.]. [Unpublished report]. Muscular stomach impaction in a juvenile spotted owl (a case study). 2 p.

An account of a single incidence of a subadult spotted owl, found in a severely weakened state, salvaged and treated by a vet for a found bone impaction in the stomach. Treatment resulted in recovery. (C)

Everett, R.; Martin, S.; Bickford, M.; Schellhaas, R.; Forsman, E. [In Press]. Variability and dynamics of spotted owl nesting habitat in eastern Washington. in Proceedings of the National Silviculture Workshop. Cedar City, UT. May 7-9, 1991.

"In this preliminary study we documented the array of stand conditions associated with six spotted owl nest sites, the character of the neighboring stands, and the disturbance regimes that created current forest structure. Forest structure and cover varied greatly among nest sites and the "neighborhood" stands, but there are areas of commonality in the presence of dense (> 70% cover), multilayered canopies and the presence of Douglas-fir and mistletoe brooms. Silvicultural prescriptions are suggested for the preservation of the spotted owl and associated ecosystems. These prescriptions attempt to mimic the intensity and frequency of processes that have created the current spotted owl habitat." (A)

Fletcher, K.W. 1990 (October). [Unpublished]. Habitats used, abundance and distribution of the Mexican spotted owl *Strix occidentalis lucida* on National Forest System lands. USDA Forest Service, Southwest Region. 56 p.

The amount of Mexican spotted owl habitat was estimated on each Forest in Arizona and New Mexico by habitat type and land status. (C)

- Folliard, L.B.; Reese, K.P. 1991. (February). Nest site characteristics of northern spotted owls in second growth forests of northwest California. Annual report for 1990. Moscow, ID: University of Idaho. 24 p.
- Forsman, E.D.; Brown, B.; Casler, B. [and others]. 1990 (October). [Annual report]. Demographic characteristics of spotted owls on the Siuslaw National Forest, 1990. p. 62-69. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.
- Forsman, E.D.; Forson, R.; Grayson, S. [and others]. 1990 (October). [Annual report]. Habitat use and home range characteristics of spotted owls on the Olympic Peninsula, Washington. p. 11-15. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.
- Forsman, E.D.; Forson, R.; Lowell, R. [and others]. 1990 (October). [Annual report]. Demographic characteristics of spotted owls on the Olympic Peninsula, 1987-1990. p. 16-26. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.
- Study objectives include: elucidate the population ecology of the spotted owl on the Olympic Peninsula, to include population age structure, and age specific birth, death, and reproductive rates, and compare survival and reproductive rates of color-banded and radio-tagged owls. (C)
- Forsman, E.D.; Horn, R.; Reid, J. [and others]. 1990 (October). [Annual report]. Demographic characteristics of spotted owls on the Roseburg District of the Bureau of Land Management, Roseburg, Oregon: 1985-1990. p. 38-61. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.
- Forsman, E.D.; Sovern, S.; Taylor, M. [and others]. 1990 (October). [Annual report]. Habitat use and home range characteristics of spotted owls on the east slope of the Cascade Range, Washington. p. 27-30. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.
- Forsman, E.D.; Sovern, S.; Taylor, M.; Rolph, D. 1990 (October). [Annual report]. Demography of spotted owls on the east slope of the Cascade Range, Washington. p. 27-30. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.
- Foster, C.C.; Burns, J.A.; Carey, A.B. [n.d.]. Roosting habits of the spotted owl in the Oregon Coast Ranges. [Abstract]. 1 p.
- Foster, C.C.; Forsman, E.D.; Meslow, E.C. [and others]. [In press]. Survival and reproductive rates of radio-marked spotted owls in Oregon and Washington. *J. Wildl. Manage.*
- Survival rates, reproductive rates, and weights of spotted owls wearing backpack style radio transmitters were compared with similar data from non-radio-marked owls. (C)



## Appendix D

Franklin, A.B.; Blakesley, J.A.; Gutierrez, R.J. 1990 (January). Population ecology of the northern spotted owl (*Strix occidentalis caurina*) in northern California: preliminary results, 1989. Technical Report 1990-9 Nongame Bird and Mammal Section Report. Sacramento, CA: California Department of Fish and Game. 45 p.

Fredrickson, R.J.; English, A.K.; Moorhead, B.B. 1990 (December). [Report]. Spotted owl inventory and monitoring Olympic National Park 1990. Port Angeles, WA: USDI National Park Service, Olympic National Park. 40 p.

Presence or absence of northern spotted owls was sampled along gradients of forest structure, species composition, and elevation in unsurveyed areas of Olympic National Park during 1990. (C)

Higginson, J. 1990. [Report]. Dealing with uncertainty in a conservation strategy for the northern spotted owl. 22 p.

The purpose of the Interagency Scientific Committee was to explore systems properties of the northern spotted owl and its habitat and to generate a strategy for its conservation. The emphasis of this paper has been to review how the team dealt with uncertainty. (C)

Irwin, L.L.; Martin, S.K.; Fleming, T.L.; Buchanan, J.B. 1991 (April). Demography of spotted owls in managed and unmanaged forests on the east slope of the Cascades Mountains, Washington. 1990 Annual Report. Corvallis, OR: NCASI. 22 p.

This is the first year report of a multiyear investigation of the effects of natural and managed fragmentation of spotted owl habitats on the Okanogan and Wenatchee National Forests, and adjacent areas on the east slope of the Cascade mountains of Washington State. (C)

Kerns, S. J. 1991 (January). [Report]. Wildlife Observations on the lands of the Pacific Lumber Company: 1990 spotted owl summary report. Round Mountain, CA: Wildlife Resource Managers. 14 p.

LaHaye, W.S.; Gutierrez, R.J. 1989 (November). [Draft]. Big Bear spotted owl study, 1989. Sacramento, CA: California Department of Fish and Game. 16 p.

Surveys were conducted for spotted owls in the San Bernardino Mountains to estimate territory occupancy, population trends and the demographic characteristics of the local population. (C)

Lehmkuhl, J.F.; Raphael, M.G. 1991 (July). [Draft]. Measurement of forest pattern for spotted owl habitat management. Olympia, WA: USDA Forest Service, Pacific Northwest Research Station. 43 p.

Lehmkuhl, J. F.; Raphael, M. G. [Draft] (10/5/91). Habitat pattern around spotted owl locations on the Olympic Peninsula, Washington. Submitted to J. Wildl. Manage.

"The intent of this study was to assess the use of circular areas on the order of 3200-ha for SPOW habitat assessment on the Olympic Peninsula and identify specific attributes that are most appropriate for measuring habitat patterns." (A)

Marcot B. G. [In Press]. Viability considerations for managing spotted owls in southern California mountains. Pomona, CA: J. Cal. State Poly.

Marcot, B. G. 1991. [Unpublished]. Vegetation and wildlife species associated with late successional forests of the Pacific Northwest. Portland, OR: USDA Forest Service, Pacific Northwest Station.

McComb, W. C. [ca. 1991]. [Report]. The role of dead wood in habitat of spotted owl prey and other old forest vertebrates. Corvallis, OR: Oregon State University. 57 p.

"This report is an attempt to document the importance of dead wood to vertebrates that inhabit coniferous forests of the West within the range of the northern spotted owl (*Strix occidentalis caurina*). Provide documentation on the functional role of dead wood to spotted owl prey species and associated old-forest species, and summarize the results that indicate that dead wood: 1) influences the presence vs. absence of a species, 2) is associated with the abundance of a species, or 3) is a habitat feature that can cause increases or decreases in the abundance of a species." (A)

McKelvey, K. 1991 (May 7). [Draft report]. A spatially explicit life-history simulator for the northern spotted owl. Arcata, CA: USDA Forest Service, Pacific Southwest Experiment Station, Redwood Sciences Lab. 23 p.

A model containing explicit links to landscape vegetation patterns was created. (C)

Menkens, G.E., Jr.; Boyce, M.S. 1990. [Report]. Comments on the use of time-specific cohort life tables. New York Cooperative Fish and Wildlife Research Unit, Cornell University. Ithaca, NY.

Meslow, E.C.; Thraikill, J.; Carey, A.B. 1990 (October). [Annual report]. Home-range size and habitat utilization of northern spotted owls: Eugene BLM District, Oregon. p. 1-2. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.

Study objectives: monitor selected pairs of spotted owls using radio-telemetry, determine the distance adult owls forage to feed young, determine habitat used by owls as compared to habitat available, locate nest sites, map all owls encountered, and determine nest success and mortality of juvenile owls encountered. (C)



## Appendix D

Meslow, E.C.; Forsman, E.D.; Thraillkill, J. [and others]. 1990 (October). [Annual report]. Demographic characteristics of spotted owls on the Eugene BLM District, Central Coast Range, Oregon. p. 78-84. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.

Study objectives include: satisfy Eugene BLM District spotted owl monitoring needs with the the study area, elucidate the population biology of the spotted owl on the Eugene BLM District (Coast Range region) by banding adult and fledgling owls to assess site tenacity, population age structure, and age specific birth, death and reproductive rates, determine total density of adult spotted owls within an intensive study are, compare population dynamics of owls in highly fragmented areas, such as our study area, to those owls in less fragmented forests. (C)

Meslow, E.C.; Wagner, R.; Bennett, G. [and others]. 1990 (October). [Annual report]. Spotted owls in managed forests: identification and evaluation of non old-growth cover types for use in habitat management. p. 85-91. In: Wildlife habitat relationships in western Washington and Oregon. USDA Forest Service, Pacific Northwest Research Station. Research Work Unit 4203. 116 p.

Study objectives include: describe habitat use by spotted owls - especially the use of non old-growth cover types, determine population parameters of spotted owls, including comparative density and annual rates for occupancy, turnover, and productivity, identify and evaluate potential management options which utilize non old-growth cover types within spotted owl habitat management. (C)

Meyer, J.S.; Irwin, L.L.; Boyce, M.S. 1990. [Draft report]. Influence of habitat fragmentation on spotted owl site selection, site occupancy, and reproductive status in western Oregon. Corvallis, OR: NCASI. 94 p.

A statistically ordinated assessment of whether spotted owls select for a variety of landscape level habitat variables was conducted on Coast Range and Klamath province spotted owl data sets. (C)

Neal, D.L.; Verner, J.; Steger, G.N.; Eberlein, G.P. 1990 (January 22). [1989 Annual report]. A study of spotted owl home-range size and composition in the Sierra National Forest. Fresno, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station. 44 p.

Nelson, T.C.; Murphy, E.C.; Self, S. 1991 (February 8). [Final report]. Sierra Pacific Industries timberlands division spotted owl management plan. Redding, CA: Sierra Pacific Industries. 229 p.

Existing habitat seral stages, owl locations, and reproductive status are described. Projected changes from timber management activities are correlated to changes in habitat over the next four decades, when size-class distribution becomes stable through planned timber harvesting. Guidelines are presented to insure a constant future quantity and distribution of suitable owl habitat. (C)

Noon, B. 1991 (February). [Draft report]. Action plan: spotted owl habitat utilization studies/providing data needed for silvicultural prescriptions. Arcata, CA: USDA Forest Service, Pacific Southwest Region. 15 p.

Paton, P.; Zabel, C.; Bingham, B.; Sakai, H.; Ogan, C. 1990 (January 22). [Progress report]. Examination of home range size and habitat use of the spotted owl in the Klamath Province. 26 p.

Peeler, K.C.; Carey, A. B.; Guetterman, J.H.; Loschl, P.J. [ca. 1989]. Temporal variation in spotted owl ranges. [Abstract]. 1 p.

"Objective - Our objective is to report the seasonal, yearly, and cumulative home ranges of four adult spotted owls, radio-tagged in spring 1986, in the Oregon Coast Ranges."  
(A)

Anonymous 1991 (August). [Unpublished]. A facade of science: an analysis of the Jack Ward Thomas report based on sworn testimony of members of the Thomas committee - A report for the Association of O & C Counties and the Northwest Forest Resource Council. Preston Thorgrimson Shidler Gates & Ellis. 28 p.

Objective - This report, prepared from depositions of each of the Thomas committee members, assessed the "objective science" of the ISC report and balanced its findings with its "professional judgements." (C)

Ripple, W.J.; Johnson, D. H.; Hershey, K.T.; Meslow, E.C. 1990 (February 25). [Unpublished ms.]. Forest fragmentation near spotted owl nest sites in western Oregon. Corvallis, OR: Oregon State University. 7 p.

Rosenberg, D.; Anthony, R.G. [ca. 1989]. [Progress report]. Estimating small-mammal abundance when capture probabilities are low. Corvallis, OR: Oregon State University. 10 p.

Small-mammal abundance is difficult to estimate when capture probabilities and densities are low. We found these characteristics to be true in northern flying squirrel populations and found that enumeration as a population-estimating technique is inaccurate because of seasonal and spatial differences in capture probabilities. (C)

Seavey, F. 1991 (July 5). [Unpublished]. Comments on update of spotted owl demography, home range and habitat data bases. 9 p.

Self, S. E.; Warner, W.; Murphey, E. 1991 (10/11). [Draft report]. A fitness based definition and description of suitable spotted owl habitat. Redding, CA: Sierra Pacific Industries. 13 p.

This study was designed to yield a "definition" of "suitable spotted owl habitat" and descriptions of "nest areas" and "suitable nesting landscapes." (C)

## Appendix D

Snetsinger, S.D.; Moorhead, B.B.; Farris, A. 1991 (March-May). [Progress report]. Spotted owl inventory-monitoring Olympic National Park. Port Angeles, WA: USDI National Park Service, Olympic National Park. 7 p.

This is a progress report assessing 6 objectives including monitoring of owls, analysis of habitat surveys, preparation of a research proposal, resurvey of transects, and banding. (C)

Thraillkill, J. A.; Meslow, E. C. [ca. 1990]. Home range size and habitat utilization of northern spotted owls in the Wolf Creek study area, Eugene BLM District, Oregon. Final progress report covering period 1 June 1986 - 1 September 1989. Corvallis, OR: Oregon State University. 26 p.

"The objectives of this study were: 1) to monitor spotted owls on the Eugene BLM District using radio-telemetry; 2) determine spotted owl home range size and spotted owl habitat use versus the habitat available to the owl." (A)

USDA Forest Service. 1991 (July). 1990 annual report spotted owl inventory and monitoring program. San Francisco, CA: USDA Forest Service, Pacific Southwest Region. 47 p.

"The Pacific Southwest Region (R5) conducted the spotted owl inventory and monitoring program on National Forests, in conjunction with the Spotted Owl Research, Development, and Application (RD&A) program. The objective of 'inventory' was to gather information on the status of spotted owl areas and populations. The objective of 'monitoring' was to determine if trends in occupancy rates of spotted owls are at an acceptable level. The objective of 'survey' was to determine whether or not spotted owls occurred within a project area and to assess possible impacts of the proposed project on owls through the biological evaluation process."

"A total of 1,868 spotted owls were located during inventory, monitoring, and survey (I/M/S) efforts in the Klamath and Sierra Nevada provinces, and on southern California forests. The number of single owls (764) is believed to be high, given that detection of the same owl could have occurred by different personnel during various Inventory, Monitoring and Survey efforts. The number of pairs (552) is believed to be the more reliable figure."

"Results from the 3-year occupancy estimates for Spotted Owl Habitat areas (SOHAs) that were monitored in 1988, 1989 and 1990 indicated that almost all SOHAs had at least one owl (98% in the Klamath province and 100% in the Sierra Nevada province) and that 95% of the SOHAs in the Klamath province and 89% of the SOHAs in the Sierra Nevada province had a resident pair in at least one year. The proportion of SOHAs with young in any one year is likely to be low; however, if reproduction is calculated on a 3-year average, the proportion increases. In the Klamath province, 36% of the SOHAs had young in 1990. The 3-year combined estimate (where a SOHA was considered reproductive if young were produced in 1988 and/or 1989 and/or 1990) was 75% for the Klamath province. In the Sierra Nevada province, 36% of the SOHAs had young in 1990 and the 3-year combined estimate was 40%."



"The productivity per pair for the 3-year occupancy estimates for SOHAs averaged 0.82 young per pair in the Klamath province and 0.67 young per pair in the Sierra Nevada province. The productivity information, when calculated as the average number of young per SOHA, is 0.50 young per SOHA for the Klamath province and 0.43 young per SOHA for the Sierra Nevada province."

"For the 3-year combined data, 79% of the Random Sample Areas (RSAs) sampled had at least one spotted owl, 38% had pairs, and 16% were occupied by reproductive pairs. The RSA sample was further defined as non-reserved and reserved."

"There was not a strong relationship between occupancy status and amount of suitable spotted owl habitat for SOHAs. The lack of significance may be related to factors such as a SOHA being a prescribed management situation to benefit owls, or birds utilizing more habitat than that identified in the SOHA and this analysis. The comparison between the amount of suitable spotted owl habitat and the occupancy status of non-reserved plus reserved RSAs indicated that there is a significant relationship between amount of habitat and occupancy status. That is, areas with more suitable habitat are more likely to have owls." (A)

USDA Forest Service. 1991. 1990 annual report - spotted owl inventory and monitoring. Portland, OR: USDA Forest Service, Pacific Northwest Region. 70 p.

The objectives were to inventory for presence and distribution of spotted owls to establish or improve spotted owl habitat area network, monitor occupancy and reproduction in a random sample of designated spotted owl habitat areas, and monitor occupancy and reproduction on reserve and non-reserve random sample areas to establish baseline data for tracking population trends on general Forest lands. (C)

US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 1991 (June). [Unpublished]. Determining minimum viable populations under the endangered species act - by Grant G. Thompson. 78 p.

This paper assess three general techniques of analysing population viability, particularly as population size decreases, at what point does the risk of extinction become unacceptably high. It also provides recommendations for conducting population viability analyses pursuant to petitions filed under the Endangered Species Act. (C)

USDI Bureau of Land Management. 1990. [Unpublished]. Northern spotted owl: the Jamison plan detailed management strategy. [Interim management guidelines for spotted owl management.] 12 p.

- The focus of "the Jamison plan" for spotted owl management is presented, with an analysis of effects of the proposed timber management program on the spotted owl. The biological analysis is divided into phases through 1995. (C)



## Appendix D

Verner, J.; Steger, G. N.; Eberlein, G.P.; Leal, D.A.; Munton, T.E. 1991 (March). Annual progress report 1990. Part 1-spotted owl home-range size and composition in the Sierra National Forest. Part 2-demography of spotted owls in the Sierra National Forest and Sequoia/Kings Canyon National Parks. Fresno, CA: USDA Forest Service, Pacific Southwest Range and Experiment Station. 39 p.

Vincent, R. E. 1990 (November) [Report]. The extension of the range of the barred owl into Oregon and potential for interaction with the spotted owl. Association of O & C Counties. 53 p.

This report was intended to examine available information in order to stimulate interest in and perhaps provide a suggestive framework for giving more emphasis on interspecific interactions that may impact the Spotted Owl. (C)

Zabel, C.J.; Bingham, B.B.; McKelvey, K.; Noon, B.R. 1991 (May 8). [Unpublished ms.]. Analysis of spotted owl habitat use in northern California and southern Oregon. 135 p.

Zabel, C.J.; McKelvey, K.; Paton, P.W.C. [and others]. 1991 (December 12). [Unpublished ms.]. Home range size and habitat use patterns of northern spotted owls in northwestern California and southwestern Oregon. 44 p.

"This study's objectives were to estimate home range size, describe habitat composition within home ranges, determine whether owls demonstrated habitat selection, and to compare these results among 3 study areas and with previous studies." (A)

Zabel, C.J.; Noon, B. 1991 (January 31). [Draft Annual Report 1990]. Demographic parameters of the spotted owl at three study sites in southwestern Oregon and northwestern California. Arcata, CA: USDA Forest Service, Pacific Southwest Region. 12 p.

"In this study we are gathering data on survival and reproductive rates of populations of spotted owls in different forest stands with varied amounts of fragmentation and a range of stand ages. We will monitor responses of owls to habitat changes such as timber harvest. Information on demographic parameters will be collected and compared among three study sties: Coos Bay BLM District and Siskiyou National Forest in Oregon, and Lassen National Forest in California. Spotted owls in Oregon are the northern subspecies, and spotted owls at Lassen are the California subspecies (*S. o. occidentalis*)." (A)

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## Appendix E Related Activities



# Appendix E

## Related Activities

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### Introduction

In addition to this environmental impact statement, there are other related activities in progress at the national and state levels and by other agencies. Most of these other activities are outside the scope of this document, the court ordered schedule, or the control of the Forest Service, yet it is important to recognize these efforts. Specifics on management activities may also be found in Appendix C.

### U.S. Fish and Wildlife Service

A Recovery Team was established to develop a plan that would lead to the conservation and survival of the northern spotted owl. The forthcoming Northern Spotted Owl Recovery Plan will serve as a guide to future Federal, State, and private activities affecting the spotted owl. The goal of the Recovery Plan will be to manage habitat so the spotted owl will no longer need the protection of the Endangered Species Act. A draft Recovery Plan is expected to be released in February 1992, and a final Plan in mid-1992.

A proposal designating Critical Habitat Areas as published in the May 6, 1991, Federal Register. The U.S. Fish and Wildlife Service accepted comments on the pre-proposal through June 5, 1991. A revised Critical Habitat proposal was published in the Federal Register on August 13, 1991. Comments on this revised proposal were accepted by the U.S. Fish and Wildlife Service through October 15, 1991. A final rule was issued in January 1992 and is reflected in the mapping of Alternative C in this environmental impact statement. After the final Recovery Plan issued, Critical Habitat will be reviewed for consistency.

### Bureau of Land Management

The Bureau of Land Management is currently in the process of formulating alternatives for their Resource Management Plans. A letter to concerned citizens was released July 30, 1991 which outlines the Revised Guidance for Formulation of Alternatives, and the Guidance for Analytical Techniques Needed to Estimate Effects of Alternatives currently in use. Drafts are expected to be released in the spring of 1992.

On September 11, 1991 the Bureau of Land Management submitted a petition to convene the Endangered Species Committee to consider applying the Endangered Species Act exemption process to 44 timber sales in western Oregon located in spotted owl habitat. The Endangered Species Committee will begin hearings in January in Portland, Oregon.



Decisions from this committee will only apply to the 44 Bureau of Land Management timber sales in western Oregon.

## National Level    Scientific Panel:

A four member scientific panel to research old-growth forests and related issues was chartered in May 1991 by the Subcommittee on Forests, Family Farms and Energy, under the House Committee on Agriculture, and the Subcommittee on Fisheries and Wildlife Conservation and the Environment, under the Committee on Merchant Marine and Fisheries. The charge of the panel, referred to as "The Scientific Panel on Late-Successional Forest Ecosystems" was to:

- Identify old-growth forest areas in the Pacific Northwest, including northern California, that may warrant inclusion in a regional reserve.
- Develop alternatives for providing interim protection for ecologically significant old-growth forests and late-successional ecosystems, species, and processes, including, but not limited to, the spotted owl.
- Prepare maps for each affected National Forest and Bureau of Land Management District which display each alternative as a graded series from most to least important for achieving protection and management objectives.
- Develop recommended guidelines for managing unreserved lands associated with each alternative, and quantify the effect each alternative will have on timber harvest levels in the affected area.

The scientific panel presented their findings and alternatives to the House Committee on July 24, 1991, which contained a range of 14 major options from the 34 alternatives analyzed. The 14 options ranged from a high timber yield to a high late-successional/old-growth forest reservation. Each alternative was then rated for providing for the long-term retention of ancient forest networks and for viable populations of the northern spotted owl, marbled murrelets, and other associated species, as well as habitat for sensitive fish stocks.

## Pending Legislation:

These bills were introduced in 1991 and address some of the same issues as this environmental impact statement. The language used to describe these bills is taken directly from the text of the bill. None of these bills have been signed into law.

**H.R. 842, "Ancient Forest Protection Act of 1991".** Official Title: To provide for the protection of the remaining ancient forests on the federal lands of the States of Washington, Oregon, and California.

**H.R. 1309, "Community Stability Act of 1991".** Official Title: A bill to assure stability of communities dependent on outputs of timber and other resources from National Forests and public lands.

**H.R. 1590, "Ancient Forest Act of 1991".** Official Title: To provide for the designation of an ancient forest reserve system, including lands managed by the Bureau of Land Management and portions of National Forests established by reservations from the public domain, and to require the Secretaries of the Departments of the Interior and Agriculture to enhance economic stability in the Pacific Northwest.

**H.R. 2463, "Forests and Families Protection Act of 1991".** Official Title: To provide for the protection and management of ecologically significant old-growth forests on National Forests and public domain lands in Washington, Oregon, and California; to ensure the conservation of the northern spotted owl and protection of other species associated with old-growth forests on such lands; to provide economic adjustment grants and benefit payments to communities and workers economically dependent on such lands; to facilitate the implementation of land management plans for such lands and federal lands elsewhere; and to ensure a stable and predictable supply of commodity resources, and the stability of communities dependent on federal lands.

**H.R. 2807, "Forest and Community Survival Act of 1991".** Official Title: A bill to establish an ecologically significant old-growth forest reserve system ensuring the conservation of the northern spotted owl and the protection of other species associated with old-growth forests securing a predictable supply of timber to afford stability to timber dependent communities in Washington, Oregon, and northern California.

**H.R. 3263, "Northwest Forest Protection and Community Stability Act of 1991".** Official Title: To provide a balanced solution to the current timber based crisis in Oregon, Washington, and northern California by establishing an ecologically significant old-growth forest reserve system, ensuring the conservation of the northern spotted owl and the protection of other species associated with old-growth forests, securing a predictable supply of timber to afford stability to timber dependent communities in the region, and providing economic adjustment assistance to communities in the region, and providing economic adjustment assistance to communities and employees dependent on the forest industry.

**S.1156, "Federal Lands and Families Protection Act".** Official Title: An Act to provide for the protection and management of certain areas on public domain lands managed by the Bureau of Land Management and lands withdrawn from the public domain managed by the Forest Service in the States of Washington, Oregon, and California; to ensure proper

conservation of the natural resources of such lands, including enhancement of habitat; to provide assistance to communities and individuals affected by management decisions on such lands; to facilitate the implementation of land management plans for such public domain lands and Federal lands elsewhere.

**S.1536, "Pacific Northwest Forest Community Recovery and Ecosystem Conservation Act of 1991".** Official Title: A bill to provide for worker and community assistance and for ecosystem conservation in the Pacific Northwest federal forest lands.

## State Level

**Washington.** The State has a timber relief package for workers and communities affected by declines in harvest levels on Federal lands. The package provides training, including self-employment training, and services ranging from additional unemployment benefits to a forest products worker employment and career orientation program. The State is also continuing with "Strength, Weakness, Opportunities, and Threat" reports designed to assist impacted communities in assessing opportunities for economic diversification. The Department of Natural Resources manages the system for meeting U.S. Fish and Wildlife Service Guidelines (USDI 1990a) on State and private lands through the Forest Practices permit process.

**Oregon.** Efforts have increased to assist individuals and communities who are affected by changes resulting from declines in harvest levels. Programs and services include extended unemployment benefits and supplemental benefits, skill assessment and retraining, and a loan fund for beginning entrepreneurial ventures. Community assistance includes a loan fund to help businesses in timber-dependent communities, loans for cities and counties to help existing businesses expand, and for other forms of economic diversification. Efforts to assist the wood products industry include establishment of a Wood Products Competitiveness Corporation to not only encourage and support cooperation among wood products firms, but to improve the level of technological expertise in the secondary forest products industry. The Oregon Forest Resources Institute has been created to enhance and support the State's forest products industry through public education, and producer support and education.

**California.** Under direction from the Board of Forestry, the State is proceeding with the development of a Habitat Conservation Plan covering the entire range of the spotted owl in California on State and private lands. The plan is scheduled for completion in June 1992. The Board of Forestry has published rules to meet U.S. Fish and Wildlife Service Guidelines (USDI 1990a). Every Timber Harvest Plan is reviewed by a biologist from the Department of Fish and Game who must certify that U.S. Fish and Wildlife Service Guidelines are met (USDI 1990a). The U.S. Fish and Wildlife Service is monitoring this process through spot sampling procedures.

## Other

In other related activities, the Department of Agriculture, Forest Service, has proposed a rule which would revise the regulations governing planning for National Forest System lands to make explicit that, once a species has been listed as threatened or endangered under the Endangered Species Act, the requirements of the Endangered Species Act would supersede the planning requirement that fish and wildlife habitat be managed to maintain viable populations of native and desired non-native species within the planning area. This proposed rule, affecting 36 CFR 219.19, was published in the Federal Register August 27, 1991. The final rule has not been issued.





# F

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## Appendix F

### **Fire and Fuels Management**



# Appendix F

## Fire and Fuels Management

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### Overview/ Historic and Current Trends

All vegetation types in the spotted owl range have evolved with fires of natural or human-caused origin. The frequency and intensity of fire over time varies greatly over the landscape and as a result of variation in fuel and weather. A combination of fire effects can occur in any stand, depending on the key variables of climatic conditions, fuels, and topography. This can result in a mosaic of vegetation.

On warm, dry sites, surface fires were a common occurrence before the advent of fire suppression. These fires kept the fuel loading to a relatively low level and killed fire sensitive plant species. Thick barked trees, such as ponderosa pine and Douglas-fir, thrived under a regime of frequent, low intensity fires. These fires killed competing vegetation, and provided a seed bed for the seedlings of these fire adaptable species. These fires also removed intermediate live fuel layers and fewer fires reached tree crowns.

Cooler and wetter sites have usually had long intervals between fires. This allowed a much greater accumulation of fuels, than on the hotter, drier sites. Consequently, fires were more likely to burn with greater intensity, and catastrophic stand replacing events were more likely to occur. In the range of the spotted owl, generally enough old, thick-barked Douglas-fir survived to seed in the newly exposed mineral soil to a new stand.

On sites dominated by western hemlock and true firs, fires also tended to be stand replacement events, and mature trees often did not survive to seed in all areas. Evidence suggests low vegetation, such as shrubs and forbs, may have dominated some sites for long periods of time, until the climax western hemlock or true firs could seed in from the un-burned edge. In other areas such as the coastal forests, light seeded hardwoods like red alder captured the post-fire site.

Climate becomes drier and warmer moving from north to south and from west to east through the spotted owl's range. Fire regimes play a greater role in establishment of vegetation patterns at the southern end of the range. These areas contain large mixed-conifer forests. In the far southern end of the spotted owl's range are areas of habitat found on north aspects and interspersed with flammable vegetation types such as mixed chaparral. The pre-European fire return interval on such sites ranged from 10 to 30 years. The effects of natural fires were variable because they burned for long periods under a wide variety of weather



conditions and were extinguished by fall rains. Such events produced a variety of intensities and hence, a variety of fire effects, through the life of the fire.

## Fire Suppression

Fire suppression during this century has created unexpected side effects. The general accumulation of fuels is one of these effects. As a result of fire suppression, the species composition of many vegetation types has shifted from the historically fire resistant ponderosa pine and Douglas-fir to more shade-tolerant species such as true firs. On these sites, firs are more susceptible to major insect and disease attack, which subsequently increases mortality and thus fuel loading. The harvesting of the valuable older, fire-tolerant, trees is accelerating the change of vegetation type to these invading species. Successful fire suppression and a lack of vegetation management can result in considerable buildup of natural fuels, thereby increasing rates of fire spread and intensity, increasing the probability of a stand replacement fire.

In the short term, fire suppression is effective at suppressing fires that would have burned at low or moderate intensity. The majority of fires which escape initial attack suppression efforts burn when fuels are dry and weather conditions contribute to large, high intensity fires. These fires are most likely to cause severe effects.

## Management Activities

Management activities can either increase or decrease the risk of fire in spotted owl habitat from hazardous fuels. Management prescriptions can include requirements to remove, burn, rearrange, chip, crush or otherwise modify dead and down fuels to reduce fire hazards that had increased due to management activities. Such modification decreases fire intensity and rate of spread and increases suppression efficiency.

Management activities that change species composition, age distribution, and stand structure affect fire regimes. The structural factors which determine crown fire potential are canopy closure, fuel ladders, and canopy height. Management activities such as spacing of planted trees, thinning of planted or natural regeneration, pruning of trees, and the growth habit of selected species can either contribute to or discourage crown fires. The species that are selected for a site, through active management or the indirect effects of fire suppression, can affect the intensity with which ground fuels burn. Species that are planted or regenerate naturally on a site affect fire intensity depending on how compacted they are, and the depth and loading of dead material and litter they produce over time.

**Wildlife.** The vegetation mosaic is naturally varied from old-growth forests to new seedlings, and the wildlife species that depend on them are equally complex. Fire tends to increase the vegetation diversity toward the early seral stages.

Fire suppression activities can directly affect wildlife species. Aerial retardant is delivered as part of initial attack suppression efforts to slow the spread of fire until ground resources arrive. Retardant drops impact roosting owls if retardant is applied to roosting sites. Line construction and felling of trees could affect spotted owls, particularly when heavy equipment is used. Indirect fire suppression methods create wildlife entrapment situations if escape routes are not provided between firing operations and the main fire. Backfire and burn-outs can also create intense pockets of burning as fires merge. Smoke, whether created by wildfire or prescribed fire, could have a disturbing effect on nesting birds.

Prey may be easier to catch during and immediately after fires due to the destruction of hiding cover. Fires temporarily affect rodent populations. Intense fires may consume grasses and shrubs, along with seeds. Fungi essential to flying squirrels may be destroyed if decayed logs and litter layers are consumed by fire. Rodents may temporarily vacate areas where food is scarce.

**Watersheds and Soils.** The effects of fire on water and soils are related. The actual quality and quantity of effects is dependent on the intensity and duration of the fire. Those fires that consume a large percentage of the pre-fire duff and live crown vegetation create situations leading to decreased infiltration of precipitation and increased overland flow of both rain and snow melt. This in turn causes erosion and stream siltation. This knowledge must be tempered with an appreciation that natural fire regimes also impacted soils.

**Air Quality.** Wildfire and prescribed fire both emit gases and particulates into the air, decreasing air quality for the duration of fire. One study, completed by the Pacific Northwest Research Station in 1991, found that the per acre emissions from prescribed fire, when added to the per acre emissions from wildfire in the Shady Beach Fire were about equal to the per acre emissions from the wildfire alone, on areas that did not receive prescribed fire. However, the prescribed fire emissions happened over a long period of time, while the wildfire emissions happened in a few days. In addition, the study concluded that the prescribed fire emissions were done under meteorological conditions that affected people much less than the wildfire emissions.

## **Environmental Consequences**

The impacts of the five alternatives on fire management and fire regimes will depend on the range of fire management activities allowed within spotted owl habitat. A range of fuel profiles must be developed that

describe acceptable spotted owl habitat in terms of litter depth, dead and down fuel loadings by size class, and live fuel profiles. Strategies for the reduction of hazardous fuels through either prescribed fire or mechanical means should be pursued in management plans for areas managed primarily for spotted owl habitat so the habitat can be protected from wildfire.

Consequences of the preferred alternative are highly favorable if measures are taken to protect designated areas managed primarily for spotted owl habitat from wildfire. Measures can be internal or external. If fuels treatment within these areas is deemed detrimental to spotted owls or their habitat, defensible boundaries may be created by intensively treating adjacent areas. On the southern end of the spotted owl's range where habitat is interspersed with other vegetation, these patches may be treated to reduce fuel accumulations without entering habitat specifically utilized by spotted owls. In areas where fuels may be treated within spotted owl habitat without altering the structural components needed for owls, this strategy should be pursued.

The consequences of the five alternatives will be proportional to the acreage removed from timber production. As described above, timber activities provide opportunities to modify fuel arrangements so that the resulting stand is less flammable. Fuel beds can be reduced in loading and depth and can be rearranged. In the short run, there probably will not be much difference in the effects of fire due to any alternative. In the long run, more wildfire and greater effects are anticipated in those alternatives that allow less timber harvesting. The increase in fire effects for Alternative D as compared to Alternative A, for example, is caused by the increase in fuel loading and fuel depth by natural accumulation. Management activities also increase access to the forest, increasing suppression efficiency. These effects are somewhat offset by the increase in the risk of fires starting from management activities.

With continued fire suppression, there will probably be a significant increase in large stand replacement fires if no management activities are employed to reduce fuel buildup. Fire history suggests that in the absence of all vegetation management within and adjacent to designated areas managed primarily for spotted owl habitat, those alternatives with the least vegetation management, such as Alternative D, are likely to have the most large-stand replacement fires.

With less management, natural fuel increases, accentuated by the shift to more shade-tolerant, less fire resistant species, will increase the risk of stand replacement fires. This increase in fire hazard is highest in Alternative D and lowest in Alternative A.

## Management Implications

Any emphasis on fire suppression and/or lack of access and fuel management within designated areas managed primarily for spotted owl

habitat without an overall increase in fire suppression personnel and equipment are likely to result in increased risk for surrounding areas.





G

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Appendix G  
**Insects and Diseases**



# Appendix G

## Insects and Diseases

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### Introduction

While an abundance of organisms inhabit the forests of the Pacific Coast States, just a few are considered to have major ecological implications for management of National Forests. A number of organisms confound human expectations by causing foliage loss, branch and stem loss, wood decay, and tree mortality which, depending on magnitude, may result in significant shifts in species composition, changes in stand structure, or the creation of various-sized forest openings. These effects may be negative or positive depending on management objectives. In the case of efforts to protect populations of the northern spotted owl, maintenance of nesting, roosting, and foraging habitat is viewed as critically important. Insect and disease effects on spotted owl habitat could be substantial.

Effects of insects and diseases on northern spotted owl habitat will differ among these four areas: 1. west of the Cascades, 2. east of the Cascades, 3. southern Oregon, and 4. the Klamath Range in California. The kinds of insect and disease effects are estimated to be essentially the same under all alternatives but the amount of area affected will be progressively greater from Alternative A through Alternatives E, B, C, and D respectively.

### Trends and Consequences

#### 1. West of the Cascades

**Overview and Trends.** The most ecologically significant disease in mature and old-growth west side stands is laminated root rot (caused by *Phellinus weirii*). *P. weirii* creates variable-sized infection centers in stands of susceptible hosts by growing across root contacts at a rate of about 1 foot per year. Douglas-fir, white fir, grand fir, and mountain hemlock are the most susceptible hosts. These species are readily infected and usually killed or blown down by high winds as a result of decay in major portions of their root systems. Other conifer species may be infected by *P. weirii* but they tolerate the disease better and are seldom killed or blown down. Hardwoods are immune to this infection. Laminated root rot is a disease of the site since the causal fungus can survive for up to 50 years in old, infected stumps and snags. Infection occurs via root contacts with new hosts that are subsequently established in the diseased area. Surveys indicate that laminated root



rot is widely distributed and occurs on about 7 to 10 percent of the forested area in western Oregon and Washington.

Douglas-fir beetle (*Dendroctonus pseudotsugae*) is the most significant insect pest of mature or old-growth west side stands. Douglas-fir is their only host in west side forests. When Douglas-fir beetle populations are low they seldom infest healthy, vigorous trees. They are mainly found infesting blown down or weakened *P. weirii*-infected trees. However, on rare occasions, Douglas-fir beetle populations build to epidemic proportions and infest numerous standing, healthy trees. This often occurs after a major catastrophic disturbance, such as a large fire or windstorm, when the occurrence of very large amounts of suitable host material favors high brood production.

**Consequences.** *P. weirii* and associated Douglas-fir beetle populations, at low population levels, would seldom, if ever, decrease spotted owl habitat quality to an unacceptable level. This is due to the slow rate of spread of the pathogen and the rapidity with which unaffected trees are established and grown in areas west of the Cascade Range. Douglas-fir, white fir, grand fir, and mountain hemlocks around disease centers would be selectively killed; rate of killing would be slow. Tree species not highly susceptible to the disease or the bark beetle would not be killed and openings would, in most cases, fill in with immune or resistant tree species such as hardwoods, cedars, or western hemlock. In mature and old-growth stands, some *P. weirii*-infected Douglas-firs survive for many years, so these trees along with others that escape infection would be present in the disease pockets for lengthy amounts of time. In general, species diversity would be enhanced in disease centers, structural diversity would be increased, and desirable snags and down trees would be created. Crown closure would be decreased especially in the upper canopy levels. This might be undesirable in stands with very large disease centers or numerous small centers. Reduced roading and management activities in Alternatives E, B, C, and D will reduce the number of new infection centers.

Douglas-fir beetle epidemics could seriously degrade spotted owl habitat. They would almost certainly be associated with a catastrophic windstorm or large fire. The triggering disturbances themselves have major effects on habitat. Douglas-fir beetle epidemics occur in relatively large patches of Douglas-fir. Killing is very rapid, occurring mostly within 1 or 2 years and then subsiding. If unmitigated, 50 to 75 percent of the area would be impacted. Effects of Douglas-fir beetle infestations could be mitigated by removing blown down or fire-damaged trees before they become infested or, if infested, before brood emerged. If such a treatment were deemed advisable, it should be done before April of the year following the windstorm or fire event.

## 2. East of the Cascades

**Overview and Trends.** Mixed-conifer stands east of the Cascade Range are affected by a large number of damaging insects and diseases. The most significant insects include the defoliators such as the western spruce budworm (*Choristoneura occidentalis*), Modoc budworm (*C. viridis*), Douglas-fir tussock moth (*Orgyia pseudotsugae*), and bark beetles like the western pine beetle (*Dendroctonus brevicomis*), mountain pine beetle (*D. ponderosae*), Douglas-fir beetle (*D. pseudotsugae*), and fir engraver (*Scolytus ventralis*). The most devastating diseases are the root diseases such as laminated root rot (caused by *P. weirii*), Armillaria root disease (caused by *Armillaria* sp.), annosus root disease (caused by *Heterobasidion annosum*), the dwarf mistletoes (*Arceuthobium campylopodum*, *A. americanum*, *A. laricis*, *A. douglasii*, and *A. abietinum*), and stem decays, especially indian paint fungus (*Echinodontium tinctorium*).

Outbreaks of defoliating insects occur over large areas in east side mixed-conifer stands. Outbreaks last for 3 to 4 years for tussock moth, and 7 to 9 years for budworm but with the potential for prolonged outbreaks of 20 or more years depending on weather and stand conditions. Larvae feed on foliage of Douglas-fir and true fir causing various levels of defoliation, growth loss, top kill, predisposition to bark beetle attacks, and sometimes tree mortality. Damage is greatest in multistoried stands with high components of host species.

Mountain pine beetle infests and kills ponderosa, western white, sugar, and lodgepole pines in pure or mixed stands that are experiencing inter-tree competition. Trees are often killed in patches. Western pine beetle acts much the same on ponderosa pine and also commonly infests individual old, low-vigor trees. The Douglas-fir beetle infests and kills Douglas-firs weakened by root disease, extensive defoliation, or drought. Fir engraver infestation normally shows a strong correlation with root diseases on white and grand firs. However, under drought conditions fir engravers infest numerous undiseased trees as well.

Root diseases are widely distributed in east side mixed-conifer stands and have a substantial long-term impact on the true fir and Douglas-fir components. They tend to occur on more of the total area, perhaps as much as 50 percent and exist in generally larger centers or more numerous closely-spaced small centers on the east side of the Cascade Range than the west side. All three major root pathogens encountered on the east side survive for long periods of time and spread from tree to tree via root contacts. *H. annosum* also spreads readily over long distances by windborne spores that infect freshly-cut stumps or wounds of white and grand fir. It is common on the east side to find two or more root pathogens acting together in the same infection center or even the same tree. Root diseased trees are usually predisposed to infestation by bark beetles.

Dwarf mistletoes are parasitic plants that spread via forcibly discharged seeds. Intensification of these pathogens is greatly favored in long-lived, multistoried host stands. Each dwarf mistletoe species is fairly host-specific, usually infecting only one or a small number of conifer species. Heavy mistletoe infections greatly reduce host vigor and may ultimately kill trees or predispose them to other pests. In east side stands, Douglas-fir dwarf mistletoe and larch dwarf mistletoe are particularly debilitating to the hosts. Not quite so debilitating are the lodgepole pine dwarf mistletoe and western dwarf mistletoe (on Ponderosa pine). True fir dwarf mistletoe is generally less damaging unless infections are colonized by canker fungi, such as *Cytospora* sp. as commonly happens in eastern Oregon. If left unmanaged Douglas-fir dominated stands would lose their mature component over the next century, compressing the vertical structure down. Because the remaining Douglas-fir trees would be heavily infested with mistletoe, regeneration will be very sparse leading to a loss of dominance for this species. Mistletoe brooms and related damage are important to a number of wildlife species, including spotted owls, for nest sites.

East side white and grand fir are especially prone to extensive infection and damage by decay fungi, especially indian paint fungus. Fungi infect through wounds, or in the case of the indian paint fungus, through small branchlet stubs. Decay fungi are favored in suppressed trees, low-vigor trees, and trees that are wounded. With indian paint fungus, extensive breakage of infected trees, often when they are still quite small, can be a significant mortality factor.

**Consequences.** Stand conditions in east side mixed-conifer stands are particularly favorable for all of the pests discussed. Many stands, especially those with major true fir components, are already being adversely affected by pest complexes composed of all or most of the insects and diseases mentioned. The past 80-year history of fire exclusion, and high grade logging in east side mixed-conifer stands has greatly favored late-successional true firs and Douglas-fir that are especially prone to insect and disease damage at the expense of the more resistant pines and larch. The shade-tolerant firs have regenerated prolifically and stands now tend to be overstocked. Where pines do remain in the stands, they are at risk of being infested by bark beetles. Fire hazard is also extremely high in many of these stands. Insect and disease activity has contributed significantly to fuel buildup.

In the absence of special preventative treatments, insect and disease effects alone, or in combination with effects of wildfires, are likely to seriously degrade quality of spotted owl habitat in many areas and will eliminate suitable habitat altogether in others. The prognosis for long-term retention of large trees and desired high canopy coverage looks doubtful.

Management of east side mixed-conifer forests could provide



sustainable, healthy stands with characteristics suitable for spotted owl habitat. Treatments should involve stocking control and tree species manipulation to favor mixes containing less damage-prone species. Treatments might include thinning from below, understory thinnings or removals, extended shelterwoods with seral tree species favored as seed trees, and prescribed underburning. Spraying insecticides to suppress defoliating insect populations in east side mixed-conifer stands will not change stand conditions to increase their health. However, such treatments may be useful for short-term protection of stands prior to silvicultural treatment.

### 3. Southern Oregon Stands

**Overview and Trends.** Southern Oregon stands are located west of the Cascade Range but have more mixed species composition than stands located farther north. Drought can be an important influence here. Douglas-fir beetle (*D. pseudotsugae*), mountain pine beetle (*D. ponderosae*), fir engraver (*S. ventralis*), and flatheaded borers (family Buprestidae) are the most significant insects of mature forests. Laminated root rot (caused by *P. weirii*), Armillaria root disease (caused by *Armillaria* sp.), Port-Orford-cedar root disease (caused by *Phytophthora lateralis*), and Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) are the most important diseases.

**Consequences.** In general, insect and disease influences on long-term quality of spotted owl habitat in southern Oregon would be very similar to those described for west side stands with two exceptions:

1. In stands along the lower elevations of the Cascades and Klamath Ranges in southern Oregon, bark beetles and woodborers kill substantial numbers of trees in drought years. Root diseased and overstocked stands are most prone to infestation and large trees are often preferentially attacked. When several dry years occur in succession, mortality can be very dramatic and stand character can be changed significantly. Crown cover reductions and loss of large trees in these instances could degrade the quality of spotted owl habitat. Stocking control could mitigate this situation.
2. In some areas, Armillaria root disease and laminated root rot cause substantial, gradually expanding, unstocked openings that become frost pockets and are not regenerated with trees. In some cases, especially on the Dead Indian Plateau, these openings may be large enough to negatively affect spotted owl habitat. Worthwhile mitigating measures may include species manipulation to favor species other than true firs and Douglas-fir in the areas around the borders of disease centers, and efforts to replant disease centers with disease resistant cold-hardy tree species.



#### 4. Northern California Stands

**Overview and Trends.** Stands in northern California bear similarity to those of southern Oregon, but further south there is an increase in the amount of sclerophyllous plants, such as tanoak, madrone, live oak, and giant chinquapin. Two general types of stands occur and are differentiated by the crest of the Klamath and the Coast Ranges. The west side has a more mesic vegetation with larger proportions of Douglas-fir. The east side is more xeric and supports either mixed-conifer or pine type stands. These bear some similarity to the west side and east side stands, respectively, mentioned above. The overstory generally consists of one or more of the following species: ponderosa pine, sugar pine, Douglas-fir, white fir, and incense cedar.

As in southern Oregon, drought and fire play a significant role in vegetative structure and composition. Summer drought is considered normal. Periodic winter droughts can have a strong influence on tree mortality and fire occurrence. Both of these environmental influences are aggravated by insects and diseases, which can increase the amount of tree mortality. Western pine beetle (*Dendroctonus brevicomis*), mountain pine beetle (*D. ponderosae*), fir engraver (*Scolytus ventralis*), California flatheaded borer (*Melanophila californica*), and fir flatheaded borer (*M. drummondi*) are the most significant insects found in mature forests. Douglas-fir beetle (*D. pseudotsugae*) infests slash and severely injured trees in these stands, but rarely infests healthy trees. Root diseases may be locally important, but less so than farther north. The most significant of these are annosus root disease (caused by *H. annosum*) in the east side stands and Port-Orford-cedar root disease (caused by *Phytophthora lateralis*) in west side stands. White pine blister rust (caused by *Cronartium ribicola*) will have an increasing effect on species composition as sugar pine regeneration is killed by the fungus and mature sugar pines die from overmaturity or overstocking. Dwarf mistletoes (*Arceuthobium* spp.) are widespread debilitating agents and can be found in most of the conifer species. Usually the dwarf mistletoes and bark beetles interact as a pest complex that results in tree mortality, especially during drought periods.

**Consequences.** The influence of insects and diseases on overall habitat condition during the short term may be minimal. In fact, insects and diseases can cause an increase in stand diversity by killing individual trees or causing small openings in northern California. However, because of fire suppression, there is a gradual shift from shade-intolerant to shade-tolerant species which tend to be more susceptible to insect and disease injury. Also, higher levels of tree mortality occur during drought periods in many overstocked stands. This by itself may not be deleterious to spotted owl habitat, but often the increased fuels result in catastrophic wildfires, as in 1987, that dramatically alter habitat over large areas for many decades.

Sustainable spotted owl habitat may be maintained and created with some management activities. Stocking control is the single most effective method to retain and create spotted owl habitat, and several silvicultural treatments mentioned above for east side stands would be appropriate. Regeneration efforts in some areas, such as under shelterwoods or in burned areas, can retain a larger component of seral species in stands. Regenerating blister rust-resistant sugar pines can help to maintain higher numbers of this species in future stands.

## Port-Orford-Cedar Root Disease

**Introduction.** Port-Orford-cedar is a highly valued tree species whose commercial production is threatened by a root disease. Strategies for controlling the impact of this disease consist of various methods of managing the sites where Port-Orford-cedar is at risk to the fungus. Flexibility in implementing these strategies is essential.

**Historic and Current Trends.** Port-Orford-cedar occurs in varying abundance in southwest Oregon and northwest California. The native range encompasses roughly the area from Coos Bay, Oregon to Eureka, California. Federal lands within the range include the Siskiyou, Six Rivers, Klamath, and Shasta-Trinity National Forests, and the Coos Bay and Roseburg Bureau of Land Management Districts.

Port-Orford-cedar is host to an introduced root disease, caused by the fungus *Phytophthora lateralis*. The fungus has spread throughout most of the northern part of the species range. The fungus moves from tree to tree through root grafting and contact, and to new locations as resting spores in moist soil attached to vehicles, humans, or grazing animals, and as swimming spores that move with overland flow of water. Infection occurs at the root tip and, over time, the fungus colonizes the root system and kills the tree. From the time of infection, a seedling generally will die in a few weeks, a sapling in a few months, and a large tree in one or more years.

An aggressive Port-Orford-cedar Action Plan (USDA, unpublished) has been developed for National Forest and BLM lands to manage the disease threat. The action plan includes research and administrative studies, monitoring movement of the disease, and the development, implementation, and evaluation of regulatory, suppression, and prevention strategies. Regulatory strategies include road closures and summer operation to reduce spore movement.

Suppression activities include three strategies. First is the removal of the host species from the infested site for a period of several years. During this period spores of the fungus cease to be produced. When this strategy is selected trees of all sizes including seedlings, saplings and large trees are killed or removed from the site. Large trees could be cut and left, however this would waste a high value product; current practice is to salvage these trees. Secondly is the addition of chlorine

to dust abatement water, fire engines, and helicopter buckets to reduce the potential of infecting streams. Third is the use of chlorine in vehicle wash water to reduce the probabilities of spreading spores from contaminated water sources.

Prevention activities include:

1. Berming roadsides to reduce splash and runoff, which in turn reduces the potential of infecting roadside trees.
2. Removing Port-Orford-cedar from roads (sanitizing) to prevent infection along the road, thus reducing the road's influence as an avenue for infection.
3. Keeping infested soil inside infested areas when maintaining roads.
4. Selecting logging systems which reduce roads and the potential for spreading spores.
5. Planning transportation systems and road locations so as to reduce the potential for introduction and spread of the fungus.

The outlook is promising that a genetically resistant strain of Port-Orford-cedar can be found through ongoing research efforts and cultured to insure the long-term retention of the species throughout its range. It will be necessary in the interim to continue aggressive control measures to slow the spread of the disease.

**Consequences.** In infected drainages, those alternatives limiting Port-Orford-cedar management, including salvage, within designated areas managed primarily for owl habitat, will result in continued mortality in infection centers already within these areas and the potential for increased spread of the disease. This problem is greatest in alternatives with the largest number of infected acres designated, and especially in Alternative D where the fragmented designated areas managed primarily for spotted owl habitat are more likely to become infected by upslope human activity.

Reduced access due to decreased roading and equipment use decreases the likelihood of new infections. This benefit is highest for uninfected areas in Alternative C and progressively lower in Alternatives B, E, and A.

Control of this disease is also significant to the larger issue of forest health. Appropriate stand-tending activities throughout the life of the stand, including disease management, are crucial to achieving the objective of restoring and maintaining a healthy forest.

If implementation of the standards and guidelines for Alternatives B through E hinder current practices of managing this fungus, a key strategy for the control of this disease, and subsequently maintaining forest health, would be eliminated.

# H

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## Appendix H Land Adjustment





# Appendix H

## Land Adjustment, Uses, and Permits

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### Historic Trends and Current Situation

#### Land Adjustment

The Forest Service's land exchange program has historically benefited both National Forest objectives and those of private landowners. Private parcels within the Forest boundaries often include meadows, springs, access routes, wildlife habitat, and other features valuable to National Forest objectives. Exchange also improves the ownership pattern for more efficient management. Owners of these private inholdings gain title typically to smaller, but equally valuable parcels near communities or other developments where more private ownership is needed. This facilitates community expansion or other development.

With many previous land exchanges, the Forest Service acquired large areas of acres of cut-over but productive timberlands, which could be managed for the public good over the long term, in exchange for much fewer, timbered acres, that could be harvested by the recipient for immediate use. Now, with growing uncertainty regarding harvesting in older stands, timberland owners have become interested in exchanging old-growth stands to the Forest Service for second-growth stands that can be managed for timber production.

### Environmental Consequences

Alternative A would not affect the land exchange program. This management tool would continue to be used in all areas to improve ownership patterns and to acquire desirable resource assets, which could include spotted owl habitat.

Alternatives B through D would follow the standards and guidelines of the ISC Strategy. These call for land exchanges to be approved by "...the interagency body organized to review implementation of the conservation strategy." Alternative E would follow the standards and guidelines of the Multi-Resource Strategy which call for land exchanges only after consultation with the Research Committee. Land exchanges, for whatever initial purpose, will be evaluated for their effect on areas managed primarily for owl habitat. Until habitat area management plans or other evaluations are completed, land exchanges affecting areas managed primarily for owl habitat could be affected, with a potential loss to those proponents (individuals participating in an exchange) who have invested funds, and with potential exchange benefits forgone, including the acquisition of owl habitat. This effect would be higher as the area designated for spotted owl habitat increases, and would

be highest in Alternative D, where this designated habitat is spread throughout most of the forested lands.

## **Special Use Authorizations**

The Forest Service authorizes hundreds of uses on National Forest lands under Special Use Permits and similar authorizations. These uses include relay sites, roads, water and transmission lines, spring development, range improvements, and so forth. These activities are permitted on National Forests because such lands are optimum for these uses, such as locating relay stations on mountain tops, or because there is little alternative, such as a water line from a spring to a private development.

Most of these types of authorizations are at the option of the Forest Service. Alternatives with the greatest restrictions will have the most effect on the granting of new special uses. Most existing uses should not be detrimental to spotted owl habitat.

## **Right-of-Way Grants**

For reasons similar to those for Special Use Permits, it is often appropriate to grant title to a right-of-way for construction of highways, transmission and pipelines, and other types of lines and improvements. These activities may have a substantial effect on spotted owl habitat depending on the project. Alternatives which restrict activities on spotted owl habitat will have a significant effect on the granting of these rights-of-ways, and vice versa. There are laws and regulations that require granting of such access that may conflict with the objectives of protecting spotted owl habitat. These will need to be resolved on a case-by-case basis.

## **Rights-of-way, Cooperatively Managed Roads, and Other Access to Private Lands**

Instances occur where proposed or existing roads provide access to private parcels through spotted owl habitat on Federal lands, or to spotted owl habitat on private lands. The Forest Service has historically permitted access to such holdings even where use of the private land was not in the best interest of agency objectives. This access could have a detrimental effect on designated areas managed primarily for spotted owl habitat. This effect is greatest in alternatives designating more area.

## **Property Boundary Surveys**

Property boundary and other section line work takes place often 1 or 2 miles or farther from private lands because of the need to find and tie in to existing old survey monuments.

Activities include surveying, marking, and posting of property lines and corners. These activities can involve clearing survey lines (usually with power equipment), and setting corners that have been destroyed. These

activities could possibly disturb nesting spotted owls. Restrictions would increase costs and might be difficult to enforce because statutory rights give access to persons who need to do this work.

## **FERC Projects**

Hydroelectric projects and related support structures exist and are being built on National Forests to help meet national energy needs. Although the Federal Energy Regulatory Commission licenses each project, environmental restrictions proposed by the surface managing agency are typically observed.

Federal Energy Regulatory Commission projects and active applications are present within designated areas to be managed primarily for owl habitat in all alternatives. Existing uses would continue, and many new-construction proposals will eventually not be built for other reasons, but spotted owl habitat designation will likely cause abandonment of some projects and increase the cost of others. This effect becomes greater in alternatives that designate more spotted owl habitat for protection: Alternatives A, E, B, C, and D respectively.





# I

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## Appendix I Pacific Yew



# Appendix I

## Pacific Yew (*Taxus brevifolia*)

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### Introduction

Of recent interest to maintenance of late-successional stage forests in the Pacific Northwest is conservation of the Pacific yew tree. Presence of taxol, an anti-cancer agent in the tree's bark and needles, has created a high and competitive demand for Pacific yew. The Pacific yew is closely associated with late-successional forests throughout its range (Marcot, Pers. comm.; Spies 1991), or in riparian areas because of infrequent fire history.

### Affected Environment

The Pacific yew is found throughout the Pacific Northwest, north into coastal British Columbia and Alaska, and south into northwest California and the northern Sierra Nevadas. There is a disjunct population in the northern Rocky Mountains in Canada and the United States (Bolsinger and Jaramillo 1990). The Pacific yew is a slow growing tree typically found in the understory of late-successional forests.

### Past, Present, and Future Trends and Uses

Between 1988 and 1990 less than 200,000 pounds of yew bark was collected in the Pacific Northwest, mostly from National Forests in Washington, Oregon, and Idaho; and from Bureau of Land Management lands in Oregon. The 1991 harvest goal of Pacific yew bark was 750,000 pounds. The average 10-inch diameter yew tree yields about 10 to 20 pounds of bark. Thus an estimated 37,000 to 75,000 trees would have been required from all ownerships in 1991. In the next 5 to 6 years some 200,000 to 450,000 trees would be required (Page, Pers. comm.).

It is estimated there are about 29 million yew trees on all Federal lands in the States of Oregon and Washington, so the amount of yew trees harvested in the next 5 to 6 years may add up to 1 to 2 percent of the total population of yew trees in those two States. The percent of taxol that is obtained from the bark is expected to decrease over the next 7 years. In 1991 and 1992, 100 percent of the taxol will come from yew bark, but by 1995 only about 50 percent of the taxol will actually be produced by the bark extraction method, and by 1998, there may be no need for bark collection. This will be due to new sources such as plantations of yew, needles, tissue culture, semi-synthesis of taxol, and total synthesis.



## Long-term Supply

Post-harvest practices that include broadcast burning to reduce fuels have reduced the occurrence of Pacific yew. Yew will sprout in the absence of broadcast burning. Yew plantings are now being prescribed on National Forests.

Where Forest Plans specify 200 to 250-year rotations, or where timber harvest is not allowed, such as in riparian corridors, the shade-tolerant yew should continue to regenerate, mature, and spread to adjacent areas. Given time and sufficient local seed sources and dispersal methods, yew may spread back into adjacent clearcut slopes as it has spread back into burned slopes for many thousands of years.

Past harvest of yew has been in association with other commercial timber harvest units. Future taxol acquisition may involve individual yew harvesting outside timber harvest units, partial bark harvest from live yew, bough cutting for needles, and other techniques.

There is limited published information on spotted owl use of Pacific yew habitat. In a 1975-76 study, yew was frequently used for roosting by spotted owls even though it was an uncommon component in most stands (Forsman, Pers. comm.) A Pacific yew environmental impact statement is currently being developed to address the issue in more detail.

## Environmental Consequences

Pacific yew, as an ecological component of the environment, is affected by management activities in its habitat, including the amount of old-growth habitat harvested, the amount of old-growth habitat set aside or remaining in a protected allocation, and the amount of yew trees harvested for taxol production.

Those management activities that would most affect Pacific yew habitat are: regeneration harvesting, road building for access, and prescribed burning.

There are two main concerns relating to the effects on Pacific yew from the alternatives addressed in this environmental impact statement: in what way do the alternatives affect the ability to provide yew bark for taxol, and in what way do the alternatives help maintain the genetic viability of this species in its environment?

**Providing Sufficient Amounts of Yew Bark.** The effects of the five alternatives on the availability of yew trees is determined by the accessibility of the trees. The amount of timber harvest under each alternative affects the accessibility of yew. The effect is reduced if standards and guidelines permit access and management of individual yew trees.

The probability of providing sufficient amounts of yew bark for taxol would be highest in the alternative that provided the most timber sale harvesting. The environmental documentation associated with timber sales would cover the harvest of yew bark and thus permit this activity.

Alternative A provides the most timber harvesting of all the alternatives and thus would increase accessibility to Pacific yew populations in the first decade. Those alternatives that set aside increasing amount of old-growth habitat by restricting timber harvest would increasingly inhibit the bark-gathering activity because of the lack of open roads serving yew areas. Alternative D would provide the lowest probability of meeting the yew bark demand.

**Maintaining Genetic Viability and Diversity of Yew.** Those alternatives that provide for a functional, late-successional forest network would best maintain the genetic and ecological viability of Pacific yew. Since yew is closely associated with this type of habitat, those alternatives that maintain the most late-successional habitat will have the highest probability of meeting this concern. The immediate concern would be during the first decade when the most harvest of yew bark may take place. Later, the bark harvesting activity may stop due to the availability of other sources of taxol.

Alternative A, with the highest level of timber harvest would impact the yew populations the most, and therefore have the lowest probability of maintaining the genetic and ecological viability in its range. This is assuming that timber harvest itself will reduce populations of Pacific yew by reducing the surrounding old-growth habitat.

With increasingly less timber harvest proposed in Alternatives E, B, C, and D, the probability of meeting the concern for genetic viability of yew increases. The long-term concern for yew populations would be best met by Alternative D because it would provide for the most functional, late-successional forest.

Future management of Pacific yew is the subject of the environmental impact statement currently being developed.



# J

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## Appendix J Monitoring Plan





# Appendix J

## Monitoring Plan

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### Introduction

Monitoring is an essential component of managing for wildlife populations. Monitoring provides information to determine if the standards and guidelines are consistently implemented, to verify whether they are working as predicted, and to determine if key underlying assumptions are sound.

Each of the alternatives analyzed in this environmental impact statement prescribes varying degrees of habitat protection and each calls for an integrated plan of inventory, monitoring, and research. Such an integrated plan is best approached through the use of adaptive management. Adaptive management is the process of evaluating management standards and guidelines with inventory, monitoring, and research data, in turn, to reassess and adjust management direction as needed to increase protection for owl habitat or management options for other forest resources.

Successful implementation of a monitoring program requires a long-term commitment to gathering field data on habitats, populations, management implementation, and environmental conditions. Results from at least several years of work are necessary for correctly interpreting how spotted owl populations respond to management guidelines. An efficient approach would entail building upon past efforts to investigate spotted owl populations and effects of management of spotted owl habitat. Current research, such as demographic studies on northern spotted owls, has provided essential data on status and trends of populations and provided the best opportunity to evaluate future responses of spotted owl populations. Also, the current monitoring program is providing essential data on locations of northern spotted owls.

The goal of integrated inventory, monitoring and research efforts is to provide the necessary information to investigate the implementation and assumptions of the management strategy and enable managers to make changes if necessary. Adaptive management cannot proceed unless a monitoring and research plan is designed and implemented over the long term to provide this information.

This section provides a framework for an overall program for inventory, monitoring, and research of northern spotted owl habitats and populations. This program would be implemented jointly by the National Forest System and Forest Service Research at several administrative levels. Technical assistance will be provided by the Spotted Owl Research, Development, and Application Program. The Forest Service Regions, National Forests, and various Research Units will be responsible for actual data collection and analysis.

## Inventory

The inventory phase of the program is designed to determine the presence and distribution of spotted owl individuals, pairs, and habitats, throughout the planning area on National Forests. Typically, inventory of such a wide-ranging species as the spotted owl does not take the form of complete censuses; such surveys would be exorbitant in cost and infeasible to conduct. Instead, inventories focus on determining presence of spotted owl individuals and pairs in selected designated habitat areas, project areas, and other high-priority sites. Inventory of habitats, however, can approach a complete census with use of remote sensing techniques such as aerial photography and satellite imagery, coupled with on the ground validation. To date, most Forests have completed habitat inventories and are completing spotted owl inventories in priority designated habitats, project areas, and other sites.

## Monitoring

There are three categories of monitoring questions:

- **Implementation Monitoring.** Was the selected alternative implemented according to standards and guidelines?

Examples of implementation monitoring questions are:

Have designated habitat areas been mapped so that they can be identified during project planning and implementation?

What is the condition of the Forest Matrix and does it meet guidelines for spotted owl dispersal?

Are proposed and active projects consistent with the standards and guidelines of the selected alternative?

- **Effectiveness Monitoring.** Did implementation of the standards and guidelines achieve the stated goals of the selected alternative? Do spotted owl populations and habitats respond as anticipated?

Examples of effectiveness monitoring questions are:

Does the type, quality, amount, distribution, and capability of spotted owl habitat change over time at predicted rates?

Are the existing descriptions of nesting, roosting, and foraging habitat correct?

Do designated areas managed primarily for spotted owl habitat, as defined by the selected alternative, provide for the predicted number of spotted owl pairs?

Is long-term occupancy of designated habitat areas related to cluster size as predicted by current demographic models?

Does growth of forest conditions that provide habitat occur at predicted rates?

Is the description of dispersal habitat correct?

Do spotted owls move between designated areas as expected?

- **Validation Monitoring.** Were the major assumptions used in developing the standards and guidelines and in analyzing effects correct, especially those assumptions having the greatest effects on predicted responses by spotted owls?

Examples of validation monitoring questions are:

How far do surviving and reproducing spotted owls move or disperse?

How do habitat conditions and forest structures in the lands between designated areas managed primarily for spotted owl habitat influence successful dispersal and movement of spotted owls?

How do the amounts and distributions of various habitat conditions and forest structures affect the population dynamics of the spotted owl?

How do experimental silvicultural practices affect various aspects of spotted owl ecology and demography?

How does silviculture that is designed to create or maintain spotted owl habitat conditions affect the abundance and availability of spotted owl prey species?

## **Research**

Much research on northern spotted owl populations and habitats has been conducted over the past two decades. Key research questions, however, remaining to be answered include those listed under validation monitoring, above. Additional research needs include the continuing determination, over time, of the demographic dynamics and population trends of spotted owls in selected study areas throughout the subspecies' range.

Specific monitoring and inventory protocols and statistically-based sampling guidelines would have to be developed for the selected alternative. Additional direction for monitoring is found in the ISC Report, Appendix R (Thomas et al. 1990). The Forest Service Spotted Owl Research, Development, and Application Program has developed an integrated inventory, monitoring, and research program, based on meetings with biologists and statisticians from the Forest Service, other agencies, and universities. After selection of an alternative, this team could assist in developing a detailed range-wide spotted owl monitoring plan.



# K

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## Appendix K Multi-Resource Strategy





A MULTI-RESOURCE STRATEGY  
FOR THE  
CONSERVATION OF THE NORTHERN SPOTTED OWL

Executive Summary

Presented herein is a multi-resource management strategy for the northern spotted owl (Strix occidentalis caurina). This strategy is offered as an option to existing guidelines, management circles, and other proposed strategies. This document describes the strategy and its scientific support, and lists priority research topics that would assist in the recovery of the spotted owl.

This multi-resource strategy combines key elements from previously proposed strategies, new (1990 - 1991) research and survey data, and innovative adaptive management principles. This strategy emphasizes the development of, and long-term support for, a continuous distribution of spotted owls fully integrated with proactive forest management for the spotted owl and other forest resources including timber.

Resolution of the spotted owl - forest management conflict is sought through the simultaneous testing of multiple operating hypotheses and management alternatives, while ensuring protection of the spotted owl. Such an approach will significantly increase our ability (shorten the time frame) to gather critical research information needed for the long-term. The long-term risk to spotted owls may therefore be decreased due to enhanced recovery processes. This strategy proposes approaches for protecting the spotted owl which also: increase compatibility with other resources, significantly reduce the socio-economic impact, increase research efficiency, and enhance recovery. As a result this proposal may enjoy broad public acceptance and support. Public support is a key element in any successful public land management policy.

In short, this multi-resource strategy would:

- 1) Establish a network of protected spotted owl habitats,
  - a) from currently reserved lands,
  - b) and supplemented, where necessary, to provide continuous habitat from British Columbia through Northern California; and,

- 2) Establish new recommendations for forest management outside of the network of protected areas, and encourage therein the creation of additional suitable owl habitat; and
- 3) Be based upon an aggressive applied-science research program designed to find more ways to protect spotted owls over its range in balance with other forest resources.

This strategy is based on a primary, north-south network of suitable habitat reserves and Multiple Pair Areas (MPAs) to ensure the long-term persistence of a continuous distribution of spotted owls. The system was developed by first locating all suitable owl habitat (as designated by and on USFS forest maps) in congressionally reserved areas (National Parks, Wilderness areas) and administratively reserved areas (e.g., National Forest Research Natural Areas).

Where gaps in the distribution of these habitat reserves existed, a series of Deferred MPAs is recommended. These areas, include suitable spotted owl habitat on federal lands that is deferred from harvest until research more fully documents the compatibility of silvicultural systems. Connecting habitat between both categories of MPAs will be managed to maintain habitat suitable for breeding.

At such time that research confirms additional silvicultural compatibility, Deferred MPAs would be subject to some level of potential timber harvest.

In addition, numerous Research-MPAs are recommended in representative spotted owl habitat on lands having sufficient owl densities to support meaningful research. The location of all MPAs was enhanced through the use of current owl distribution maps.

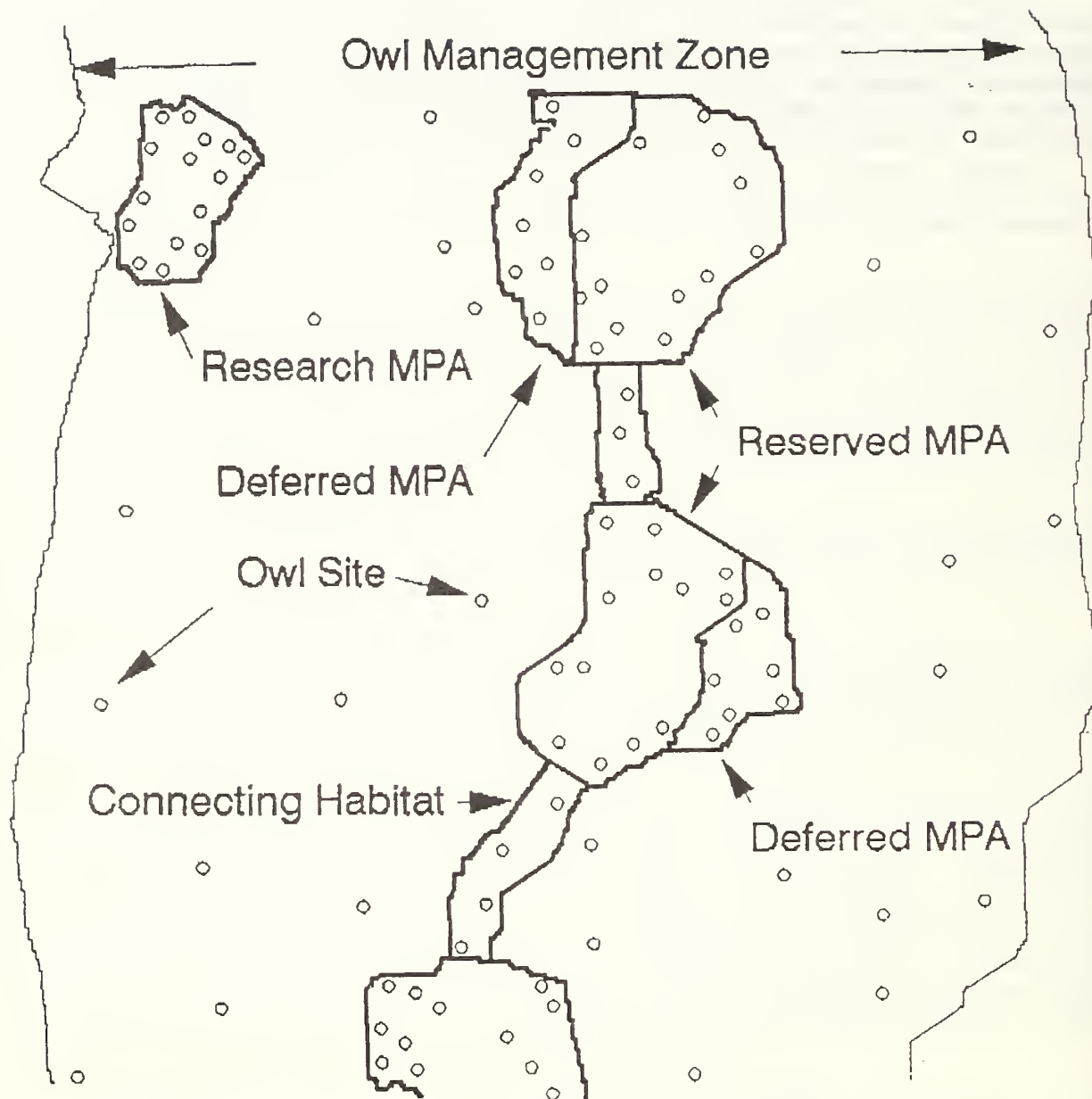
The final element of this strategy is a set of recommendations for proactive forest management of areas outside of MPAs. These recommendations include the maintenance of single-pair, few-pair, and continuous owl sites; as well as forest management recommendations for enhancing owl habitat throughout the owl-management zone (area outside of the MPAs that will have special management direction). In this strategy, private landowners represent potentially important contributors to the development and maintenance of suitable owl habitat and the conservation of the owl.

This multi-resource strategy recommends proactive owl population management, the simultaneous testing of multiple operating hypotheses, and the establishment of monitoring and adaptive-management feedback loops. This strategy builds on the sound biological tenet of a continuous population distribution, incorporates site-specific management flexibility, and provides for replacement habitat.

In addition to a description of the alternative, this document includes a detailed discussion on the scientific support for this alternative, and a listing of priority research topics for recovery of the spotted owl.

This revision of the alternative incorporates standards and guidelines developed for the U.S. Forest Service Environmental Impact Statement on Management for the Northern Spotted Owl in the National Forests. Future revisions are expected based on peer review and incorporation of more site specific data for lands outside of the National Forest system.

Figure 1.





## CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY .....	i
CHAPTER I - INTRODUCTION .....	1
CHAPTER II - THE STRATEGY .....	4
General Description .....	4
Site Specific Management Concerns .....	7
General Forest Management Concerns .....	9
Standards and Guidelines .....	10
CHAPTER III - BIOLOGICAL FOUNDATION .....	18
Provision for a Well-Distributed Population .....	18
Multiple-Pair Habitat Blocks .....	19
Inter-MPA Distance .....	20
Maintaining a Connected, Interbreeding Population .....	21
Concern for Fragmentation Effects .....	22
Federally Mandated Reserve Areas .....	25
CHAPTER IV - SILVICULTURAL BASIS .....	29
Developing Silvicultural Prescriptions .....	29
Stand-Level Considerations .....	30
Landscape Considerations .....	31
Partial Harvest Strategy .....	32
CHAPTER V. - ADAPTIVE MANAGEMENT .....	35
LITERATURE CITED .....	38
APPENDIX A - Reserved vs Non-reserved Areas .....	44
APPENDIX B - Monitoring .....	46
APPENDIX C - Multi-resource Strategy Statistics .....	48
APPENDIX D - Glossary of Key Terms .....	50
APPENDIX E - Mapping Criteria .....	53
APPENDIX F - NFPA/AFC Spotted Owl Subgroup .....	55



## CHAPTER I. INTRODUCTION

What follows is a multi-resource strategy for maintaining a well-distributed, continuous population of northern spotted owls (*Strix occidentalis caurina*) from British Columbia through Northern California. This proposal incorporates new research and builds on relevant elements of previous strategies (e.g., Thomas et al. 1990). It draws heavily from existing reviews, including that of Anderson et al (1990), Irwin (1990), and Thomas et al. (1990), supplementing them with more recent information.

This proposal does not discard previous approaches. Rather it is an interim plan (5-10 years) that contains significant overlap with previously published strategies. Moreover, this proposal can evolve into a long-term plan via further research, monitoring and feedback mechanisms. Thus, this is a fluid strategy designed to incorporate new information as it becomes available.

Development of this multi-resource strategy was based on the fact that options remain to accommodate owls in a managed forest. This strategy is predicated upon (a) the unequivocal value of a continuous distribution of spotted owls to the long-term persistence of the species, and (b) the recognition of variation in forest conditions occupied by the owl and its prey across the owl's range.

Spotted owl habitat is influenced by more than the age of coniferous forests. Major determinants of habitat selection among spotted owls include size, distribution, and layering of overstory and understory hardwoods; distribution and density of other understory vegetation; and topography. These factors and their use vary across the geographic range of spotted owls. Such variability provides numerous opportunities to develop a multi-resource strategy that takes advantage of local conditions to meet an overall management goal. Incorporating site-specific flexibility is a major strength of this proposal.

This strategy provides for active silvicultural management outside of a central secure system, comprised of Reserved and Deferred MPAs and Connecting Habitat. Such management allows for replacement habitat that may be lost due to wildfire or other catastrophe over the long-term. Management options may include manipulation of habitat for prey enhancement or placement of nest boxes in sites with limited nesting opportunities. This multi-resource strategy also encourages captive breeding programs, outside of the central secure system, that could satisfy particular research needs and allow for judicious man-induced colonization,

if necessary, of managed sites that become suitable through forest growth and proactive management.

The major concepts, principles, and assumptions employed include the following:

- A. Structural features that are found most frequently in mature and old-growth forests (i.e., large trees, snags, downed logs, multi-layered stand conditions) also occur in many managed forests. Development and maintenance of habitats with these structural features should comprise a central part of any successful strategy over most of the owl's range.
- B. Areas with such structural features that are currently reserved from timber harvesting by legislative mandate (e.g., National Parks, State Parks, Wilderness Areas, National Recreation Areas) or by administrative action (e.g., Forest plan allocations, Research Natural Areas, long-rotation areas, areas difficult to regenerate, visual corridors, etc.) are emphasized, to the degree that they already provide secure suitable habitat for owls. Their inclusion does not necessitate additional socio-economic costs.
- C. Sub-populations of owls that contain multiple pairs with inter-connecting territories provide the greatest contributions to long-term success of the species.
- D. Sub-populations that exist in moderate to high densities in managed drainages adjacent to multiple-pair areas contribute more to future populations of owls than isolated pairs or small, isolated sub-populations.
- E. Population viability is best assured by emphasizing sub-populations that currently exist in suitable habitats (as evidenced by high densities and relatively consistent reproductive performance); and by maintaining and enhancing connectivity to result in a more or less continuous distribution.
- F. Simultaneously implementing and testing several credible management options within a dynamic conservation strategy (e.g., continuum from reserved to managed sites) provides the most efficient means of balancing needs for the owl with those for a sustained economy over the long run.
- G. Timber harvests can be scheduled over time and space in many forests which would result in a continuous landscape mix of suitable owl habitats (i.e., habitat which supports reproductively successful pairs, foraging habitat, or connectivity among sub-populations.)
- H. Hands-on management procedures that are biologically supportable and economically feasible can be used to augment

owl populations in some areas (e.g., egg transfers to maintain genetic variability, development of nesting structures).

A fully dynamic strategy is necessary for managing dynamic forest ecosystems such as those in the Pacific Northwest and northern California. A successful strategy must take advantage of the natural variability, and not try to overcome this variability through administrative simplification.

It is also true that unit costs (per owl pair) of providing reserved habitat vary significantly across the range of the spotted owl. Such cost factors should be used in decisions for constructing a conservation strategy to keep it based in reality, thereby enhancing its chances of success.

The map associated with this multi-resource strategy was developed using available suitable owl habitat maps from the USDA Forest Service, and information on owl locations and biology. This is a revised (more detailed) map and replaces the map released with the first draft of this alternative in September, 1991. Future refinements will be made for lands outside of the National Forest system as more complete information becomes available.



## CHAPTER II. THE STRATEGY

Following is a description of the recommended multi-resource strategy. The scientific support for this strategy is presented in subsequent chapters and appendices.

This multi-resource strategy develops a central system of secure suitable owl habitat that will be the foundation of a continuous owl distribution. To achieve this goal, areas of habitat are identified which support multiple-pair owl populations,  $\geq 20$  pairs in Oregon and Washington and  $\geq 10$  pairs in California. These areas are connected by an area of designated habitat that is capable of supporting individual- or few-owl pairs. This approach recognizes the variability across the range of the spotted owl, by identifying different management recommendations for each physiographic province.

Development of this multi-resource strategy began with the collection of USDA Forest Service maps of land allocations, suitable owl habitat, and owl locations for the tri-state owl range. "Suitable owl habitat" was in all cases based on state and federal agency biologists' determinations.

The authors first identified those suitable habitat areas that occur within Congressionally reserved lands (e.g., suitable habitat within Wilderness Areas and National Parks). Next, suitable habitat areas were identified that are administratively reserved through National Forest Plans (e.g., Research Natural Areas, roadless areas, areas that are difficult to regenerate, visual corridors).

This mapping exercise revealed a significant network of suitable owl habitats that are already in Congressionally and administratively reserved areas. However, while impressive and extending through the full range of the northern spotted owl, this network was not continuous. Therefore, this strategy recommends adding suitable habitat from adjacent commercial forests to meet the goal of a habitat system that would support a continuous population of owls from British Columbia through northern California.

For Washington and Oregon, this multi-resource strategy recommends maintaining large blocks of suitable habitat capable of supporting  $\geq 20$  pairs of spotted owls (Multiple Pair Areas, or MPAs), connected by habitat capable of supporting single- or few-owl pairs. For the Klamath Province in Northern California, excluding coastal California, blocks of habitat are recommended to support  $\geq 10$  pairs of spotted owls. The smaller areas in California

are recommended as more restrictive guidelines are incorporated on lands outside the MPAs and because of the current density of owls found on managed lands in this area. Within the general forest, owl-management zone around these MPAs, lands should be managed on a watershed basis to maintain sufficient quantity and quality of habitat to support interconnecting pairs of spotted owls. MPAs were identified through the combined use of maps of suitable owl habitat on National Forests; BLM and USFS maps that indicated areas of high, moderate, and low densities of owls; and HCA maps from Thomas et al. (1990).

The MPAs are classified into two categories of management emphasis: Deferred or Research. Deferred-MPAs are those MPAs within the central secure system of spotted owls where timber harvests on federal lands are to be deferred until such time that silvicultural practices are documented to be more fully compatible with protection of spotted owls. Complete documentation of silvicultural compatibility likely will be a lengthy process involving years for modest practices (such as light thinnings) or even decades for regeneration techniques, and requiring long-term commitments in administration and financing. Such documentation would be developed in Research-MPAs in conjunction with owl sites in the owl-management zone outside of the Reserved/Deferred MPAs.

Research-MPAs are identified in situations that are somewhat (7 to 15 miles) geographically separated from the central secure system of owls and owl habitats. Research-MPAs are large enough to hold  $\geq 15$  pairs in Washington and Oregon and  $\geq 10$  pairs in California. These are areas where options exist to apply various stand-level treatments and/or to conduct landscape experiments. Studies could range from selective harvests, to irregular shelterwood harvests, to applications of New Forestry (Franklin 1989) such as retention of green trees, snags, logs, etc.

Research-MPAs are arranged in representative suitable habitat types, and in areas of known adequate owl density to provide sufficient replication for making valid inferences, following Thomas et al. (1990). These areas were located such that the consequences of potential mistakes would minimize impacts to population viability over the long run. Furthermore, these areas provide a conservative test: if forestry practices can be shown to maintain owl populations in Research-MPAs with fewer than 20 pairs of owls, they should be applicable to widespread areas.

Spotted owls in judiciously managed forests will contribute significantly to future populations, and will function well in landscapes that contain mixes of reserved areas, multiple-pair areas, and adjacent managed forests. Thus, this multi-resource strategy also recommends maintaining (or developing) habitat capable of supporting single, few, or continuous pairs of owls between MPAs to provide continuity. The system of MPAs, linked

with connecting habitat will provide a north-south central secure habitat base for the spotted owl. (See Figure 1, page iv)

The owl-management zone will be managed at two levels of intensity for the spotted owl. Within the "connective habitat" portion of this area, between and outside of the MPAs, forest management should recognize the need to maintain or, where appropriate, develop suitable habitat (including nesting, roosting, foraging, and/or dispersal habitats). The number of owl pairs included in this area will vary when the distance between MPAs, size of associated MPAs, and local conditions are considered.

Owl habitat management outside of the MPAs and connecting habitat but still within the owl-management zone, will emphasize foraging and dispersal habitats. Based on recent surveys for owls in forests that have been managed without special regard for the owl, there will be numerous, but probably relatively scattered, owl pairs (e.g., Miller et al. 1991).

For the owl management zone outside of the MPAs in the Klamath Province of Northern California, this multi-resource strategy recommends maintaining (or developing) a continuous owl distribution through management on a watershed basis, utilizing 3,000- to 5,000-acre watersheds. Recognizing U.S. Fish and Wildlife Service approved habitat definitions, which are different than the Forest Service definitions, this strategy would maintain 50% of each watershed in suitable habitat (Nelson et al. 1991). A minimum of 40% of each watershed would be in nesting and roosting habitat. These areas comprise the lands east of the western-most National Forest boundaries that are not included in MPAs. Based on Forest Service definitions, between 30-50% of each watershed will be in nesting, roosting and foraging habitat.

For those lands in California west of this boundary, existing management plans should continue to be developed and implemented. Current management of these lands is to prevent loss of owls or owl habitat. Except for a few small BLM parcels, State and Federal Parks, and the Jackson State Forest, these lands are in private ownership. As a result, this area provides a unique opportunity to develop a management strategy(s) independent of what occurs on the federal landscape to the east. Such conservation plans are being developed, and will provide site-specific management recommendations for this area.

This strategy assumes that various methods of timber harvest can be scheduled safely, to greater or lesser degree depending upon the physiographic province, in habitat occupied by spotted owls. The areas where empirical information strongly supports this include much of northern California (e.g., Irwin et al. 1989b, Pious 1989), the Klamath Province in Oregon (e.g., Meslow et al. 1986, Anderson et al. 1990), parts of western Oregon (Miller et al. 1991), and mixed conifer forests on the eastside of the Cascades



Mountains in Washington (Buchanan, 1991). In fact according to recent research on owl nest sites and nearby habitats (e.g., Everett et al. 1991, Buchanan 1991), silvicultural prescriptions appear necessary to maintain owl habitat in eastside mixed-conifer forests to minimize and account for major risk of stand-replacement wildfires.

### Site Specific Management Concerns

**Olympic Peninsula.** -- Recognizing the reality of existing land ownership patterns and distributions of spotted owls, this multi-resource strategy proposes one large area comprised of suitable habitat within the Olympic National Park and adjacent, existing reserved lands within the Olympic National Forest. The owl population there contains well over 100 interbreeding pairs which, barring catastrophic events, should ensure its long-term survival. No individual pair sites are recommended to develop continuity with the Cascades populations due to the high cost and limited biological value associated with such a strategy. Genetic or demographic variability, if identified as a problem in the future, would be maintained via egg or subadult transfers from other areas in the Cascade Mountains. Another potential option to maintain high levels of owl densities in this province, would be to manage all of the land on long rotations emphasizing shelterwood systems where even-aged management is required.

**Washington Cascades-West.** -- Eleven MPAs would be established, including four 15-pair Research-MPAs and seven  $\geq 20$ -pair Reserved/Deferred MPAs, separated by  $\leq 15$  miles. MPAs would be connected by a band of habitat twice the width of the annual average home range, managed to support multiple pairs of owls. The Research-MPAs would be  $> 7$  and  $< 15$  miles west of the central system of Reserved/Deferred MPAs. Where large areas of suitable habitat have already been reserved by Congress, additional strategies such as managing all National Forest lands on long rotations using alternate silvicultural practices could be employed. These could emphasize shelterwood systems where even-aged management is required, increased fire protection, and thinning regimes to promote suitable habitat conditions.

**Washington Cascades-East.** -- Eight MPAs would be established, including four  $\geq 20$ -pair Reserved/Deferred MPAs separated by  $\leq 15$  miles and four 15 pair Research-MPAs at locations 7-15 miles east of the central secure system. Within the general forest, owl-management zone of this province, habitat around spotted owl sites would be maintained in Mixed Conifer forest using silvicultural prescriptions described below.

**Southwestern Washington and Northwestern Oregon.** -- Here, because of current habitat conditions, very few owls occur. It is clear that drastic, long-term actions would be necessary to create habitats suitable for occupancy by multiple pairs in the future; and that such actions would require unbearable direct and

opportunity costs. Furthermore, the history of the frequency of catastrophic wildfires, such as the Tillamook Fires, the Oxbow Fire, etc., in this region suggests that such an investment may not be warranted at this time. As a result, no MPAs are recommended for this area. Thus, the primary focus of resources would be within the central (inland) general forest, owl-management zone, as this likely will be much more effective for the overall recovery of the species. This is not to discount the value of those owl pairs that do exist in the Southwest Washington and Northwest Oregon provinces. In these areas, such owl sites should be used as case-study experiments to aid scientific understanding of owl biology. These experiments might include creation or retention of large diameter snags and cull trees, or precommercial thinning to increase prey densities and owl foraging efficiencies.

**Oregon Cascades.** -- In the Oregon Cascades, fourteen MPAs, including nine  $\geq 20$ -pair Reserved/Deferred MPAs and five 15-pair Research-MPAs, would be established. Spacing and connecting habitat guidelines are the same as for the western Washington Cascades.

**Oregon Coast Range.** -- Here, eleven MPAs (eight  $\geq 20$ -pair Reserved/Deferred and three 15-pair Research) would be established. Spacing and connecting habitat guidelines are the same as western Washington Cascades. Because of the concern raised by the U.S. Fish and Wildlife Service for owls on the coast range, the lands outside of MPAs and connecting habitat on the Siuslaw National Forest will be managed in the same way as connecting habitat.

**Eastside Oregon Cascades.** -- Maintain two 15-pair Research-MPAs. In other areas, conduct management experiments so as to improve owl habitat by silvicultural methods. See the following section on General Forest Management Concerns for additional silvicultural recommendations.

**Oregon Klamath Province.** -- Here, seven MPAs, including six  $\geq 20$  pair Reserved/Deferred MPAs and one 15 pair Research-MPA, are established. Spacing and connecting habitat guidelines are the same as for western Washington Cascades.

**California Klamath Province.** -- Here, twenty-two MPAs, including 16 Reserved/Deferred MPAs and 6 Research-MPAs, are established, sized to maintain  $\geq 10$  pairs of owls and spaced  $\leq 12$  miles apart. The Research-MPAs would be established for the evaluation of forest management practices which might be more-compatible with spotted owls on a landscape basis. Throughout the remaining general forest in this province, partial harvesting and other silvicultural prescriptions would be used to maintain habitat suitable for up to 6 owl pairs per township. For the private and State lands within the California coastal region, continue the development of specific conservation plans for this area.



## General Forest Management Concerns

An important element to this multi-resource strategy is the recognition of the owl-management zone outside of the MPAs, managed at two levels of intensity. Within this zone, active timber management programs will be conducted, but will be conducted with regard to the need for maintenance (and in some cases development) of spotted owl habitat for nesting, roosting, foraging and dispersal habitat. Suitable owl habitat and breeding pairs of spotted owls already exist on managed forest lands, and should be maintained, and even enhanced, through a proactive silvicultural program as described below. The scientific basis for such a program is found in Chapter IV.

The primary objective for management within the owl-management zone outside of the MPAs is to take advantage of the inherent variability in site (habitat) conditions and the owl's variable use of those elements. In order to realize the local potential, management prescriptions must be site-specific, but they cannot be "blind" to the overall forest or province conditions. Thus, any general "guidelines" should provide for operational flexibility.

This strategy would incorporate a full mix of operational alternatives, a flexibility not present under current management, eg. guidelines and circles being utilized by State and Federal Agencies. By removing these restrictions, and incorporating management flexibility, the private landowner would be provided with the incentive (a viable timber program) to voluntarily contribute to the development and maintenance of suitable owl habitat throughout the general forest landscape.

**Landscape Perspective.** -- Objectives for stand management must be developed within the context of the surrounding landscape, specifically regarding the stand's current and potential future contributions to spotted owl habitat. Watersheds managed under this approach typically will have a broad mix of different silvicultural methods applied within them that reflect the highly variable existing stand conditions. Within the general owl management zone, outside of the MPAs, forests would be managed at two different levels for spotted owls.

The habitat between MPAs, referred to as "connecting habitat", should be managed on a watershed basis to contain an appropriate amount of suitable habitat to support additional breeding pairs of owls. The amount of suitable habitat (nesting, roosting, foraging, and dispersal) needed in an area is highly variable. For example, in areas of stark contrast in forest cover (very young non-suitable habitats vs. only mature and old growth stands) the minimal amount of suitable habitat needed to sustain a continuous population of spotted owls may only be 30% of the watershed based on data in Anderson et al. (1990) that suggest such a threshold. Also, the average owl pair on BLM sites in western Oregon has 31% old-growth

within 0.5-mile radius (Meyer et al. 1990). In other areas with a greater mix of forest conditions, 30-50% of the watershed may need to be in suitable habitat. Forest management prescriptions must be sensitive to local owl population densities, forest stand (age-class distribution, structure, etc.) conditions, and landowner objectives.

Areas outside of the central secure system of reserves, MPAs, and connecting habitat, but still within the owl-management zone would be managed to maintain, or where possible enhance, spotted owl dispersal habitat using forest prescriptions that take advantage of site-specific conditions (as described below). Up to six active owl sites per township, which varies by province, should also be maintained in this area.

This mix of intensity and site-specificity will maintain suitable habitat for spotted owls through time, as well as maintain within-stand and landscape diversity. By maintaining or creating this diversity, the concept of synergism is incorporated in landscape management. When coordinated across a landscape, the overall net benefits derived from a series of individual stand management activities are greater than simply the sum of individual stand management benefits.

## Standards and Guidelines

**Goals \*** Maintain, over the forest landscape, a continuous, interbreeding population of northern spotted owls. Such a population has a very high probability of continued existence in both the short and long term. The research, integrated into this strategy, will be used to improve these standards and guidelines.

**Objectives - Short Term**      \*      Establish a system of well distributed reserved and deferred habitat and management guidelines which insures the long and short term viability of the species and maintains or enhances long term management options for the owl.

**Objectives - Long Term**

- \*      Manage for a continuous distribution of interbreeding pairs of owls.
- \*      Manage habitat and owl distribution so that pairs and sub- populations of owls interact genetically and demographically, to minimize risks to long-term viability.
- \*      Conduct research to clarify habitat use and relationships, and to define silvicultural practices which enhance or maintain habitat used by the owl as well as produce new habitat in the shortest time possible.
- \*      Conduct research and monitor to evaluate whether the goals and objectives are being met.

- \* Incrementally modify the strategy in terms of land classifications and management prescriptions as new research information warrants.

#### DESCRIPTION OF THE MULTI-RESOURCE STRATEGY

The following provides a description and outline of the Multi-Resource Strategy.

#### Multiple-Pair Areas (MPAs)

##### Definition:

A contiguous block of habitat to be managed for multiple interbreeding pairs of northern spotted owls.

Application varies throughout the range based on differences in physiographic provinces, local conditions and MPA type.

##### Types of MPAs:

- \* Reserved-MPAs - blocks of habitat where timber harvest is precluded which, in combination with Deferred-MPAs, will each support at least 20 pairs in Oregon and Washington and 10 pairs in California.
- \* Deferred-MPAs - blocks of habitat that by themselves or in combination with Reserved-MPAs will each support at least 20 pairs in Oregon and Washington and 10 pairs in California. In these areas timber harvest will be temporarily precluded.
- \* Research-MPAs - blocks of habitat that will each support at least 15 pairs in Oregon and Washington and 10 pairs in California to be used in an integrated research effort.

#### Connecting Habitat

##### Definition:

A band of habitat between Deferred/Reserved MPAs equal to twice the width of the average annual home range.

##### Intent:

- \* To support additional breeding pairs in a managed network of nesting, roosting, and foraging (NRF) habitat and dispersal habitat.
- \* To provide connectivity between Deferred/Reserved MPAs.

#### Central Secure System Habitat

##### Definition:

A band of forest providing for a continuous, well distributed, population of breeding pairs of spotted owls. It is comprised of all



Reserved/Deferred MPAs plus Connecting Habitat.

Intent:

- \* To insure population viability by providing for long term occupancy and by minimizing risks of local isolation and extinction.
- \* To support a continuous well distributed population of interbreeding pairs within a network of 10- to 20+- pair areas and connecting habitat.
- \* To maintain or enhance habitat continuity and quality.
- \* To maintain or enhance local or regional population levels.
- \* To hedge against catastrophic loss.
- \* To provide for genetic and demographic interaction of owls.

Owl Management  
Zone: Oregon  
and Washington

Definition:

All lands outside the MPA and Central Secure System and inside the area defined on the map, within which owls and their habitat will be actively managed.

Intent:

- \* To take advantage of the inherent variability in site (habitat) conditions and the owl's variable use of those elements for the maintenance and enhancement of dispersal habitat.
- \* To clearly identify the area necessary to be managed for the short and long term viability of the species.
- \* To provide habitat for dispersing owls, occasional pairs, and a floater population.
- \* To gain experience with site-specific modifications in forest practices.

Owl Management  
Zone: California

Definition:

All lands outside the MPA and Central Secure System and east of the coastal private lands, and inside the area defined on the map, within which owls and their habitat will be actively managed.

Intent:

- \* To develop and maintain a continuous distribution of habitat capable of supporting breeding pairs of owls.

**MANAGEMENT  
PRESCRIPTIONS**

The following are the management prescriptions that will be applied to the areas identified in this alternative.

**The Research  
Committee**

Within one year a committee (the "Research Committee") comprised of Forest Service, BLM, State, university, and independent scientists will design and implement an integrated research and monitoring program to clarify habitat use and relationships in order to define silvicultural practices that enhance or maintain habitat used by the owl.

**Reserved-MPAs**

\* No change will be made in the present direction of management for all forested lands in this category.

**Deferred-MPAs**

**Timber Management**

\* Prohibit timber harvest of any age-class of forest, except activities demonstrated through experimentation to facilitate the development of suitable habitat and approved by the Research Committee. These could include:

- Pre-commercial and commercial thinnings where such activities would shorten the time required for such stands to reach suitability for dispersal, forage, roosting or nesting habitat.
- Salvage of blowdown timber in excess of that needed to provide for prey habitat if such salvage can be accomplished in such a way which does not disturb owl activity or alter existing habitat conditions.
- Salvage of catastrophic standing dead timber to the extent it is in surplus of that needed to provide nesting components of future nesting habitat.

**Fire Management**

\* Review existing fire management plans for compatibility with MPA objectives.

**Road Construction**

\* Except as determined compatible through research, new roads should be located in MPAs only when no feasible alternative is possible. When roads are constructed, they should be located and engineered to minimize the loss and alteration of existing nesting habitat. Roads should be situated at



least 1/4 mile from the activity center of any known active pair.

- \* Existing road systems can be left open and maintained to a standard consistent with the other resource uses of the area, i.e. recreation, hunting, etc.

#### Land Exchanges

- \* Allow exchange of forested lands from Federal ownership or acquisition of private ownership only after consultation with the Research Committee.

#### Mining Operations

- \* Mining operations which disturb small acreages of forested land are allowed as long as they do not disturb any habitat within 1/4 mile from an active activity center and comply with the other standards and guidelines of this MPA type.

#### Research-MPAs

- \* All standards and guidelines for Deferred-MPAs apply to Research-MPAs except as modified by the Research Committee.

#### Connecting Habitat

##### General Guidelines

- \* Each watershed, or portion thereof, within this area will be managed to maintain nesting, roosting, foraging and dispersal habitat to support additional breeding pairs.
- \* The amount of NRF habitat needed in each area varies. In areas of sharp contrast in forest cover (very young non-suitable habitats vs. only mature and old growth stands) the minimal amount of such habitat appears to be 30%. In areas with a greater mix of successional stages, 30-50% of the area may need to be in a suitable condition.
- \* Take advantage of the inherent variability in site (habitat) conditions and the owl's variable use of those elements for the maintenance and enhancement of dispersal habitat.
- \* Retain present nesting structures as they exist. Plan for the replacement of these features as needed.
- \* Limit openings between nesting, roosting, and foraging habitat or dispersal habitat to 1000 feet.

- \* Survey and inventory entire area to determine location, occupancy, and status of all existing owls using extensive inventory techniques.

#### Resource Management

- \* No vegetative management activities will be allowed within 1/4 mile of actively nesting pairs, i.e., during the nesting period.
- \* All forms of resource management are allowed as long as they comply with the other standards and guidelines applying to this MPA type. Management plans should be designed to enhance the future development of owl habitat.

#### Timber Management

- \* Active timber management programs will be conducted with regard to the objectives for maintenance and creation of spotted owl habitat for nesting, roosting, foraging and dispersal.
- \* Integrate ("feather") stream, lake and other wetland protection zones into upslope prescriptions.
- \* Where an understory or midstory of hardwoods contributes to the habitat suitability of the stands and landscapes, prescriptions should provide for retention of that tier until final regeneration harvest. Ensure that future developing stands contain this hardwood component.
- \* Thinnings should be considered where canopy closure is >80% or where understory is excessively dense. Thin to provide clearance for flight and access to prey and increase crown volume and tree diameter.
- \* Design prescriptions to increase the percentage of overall canopy cover and habitat diversity within a watershed. Owl habitat should probably have at least 40% canopy cover, and not more than 80% canopy cover.
- \* Silvicultural practices such as seedtree, shelterwood, or selective harvesting should be emphasized where practical.
- \* When using seedtree or shelterwood prescriptions, modify their implementation as follows:

- Do not schedule seedtree or shelterwood for harvest at the overstory removal step. Include site preparation and planting with genetically superior stock to ensure sound regeneration.
- \* In coastal redwoods, uneven-aged systems should emphasize group selection to maintain intolerant and stump sprouting species. Maintain groups of trees with mistletoe to promote potential nest sites.

#### Fire Management

- \* Retain standing and down, dead woody material in harvest units. Where possible plant through slash. Utilize slash burning prescriptions that maintain as much of the 100- and 1,000-hour timelag fuels as possible.
- \* Prescriptions should be developed to interrupt continuity of fuels (both horizontally and vertically) especially in the Klamath Province and the east side of the Cascades.

#### Owl Management Zone, Oregon and Washington (except Siuslaw)

##### General Guidelines

- \* Take advantage of the inherent variability in site (habitat) conditions and the owl's variable of use those elements for the maintenance and enhancement of dispersal habitat. Each watershed (approx. 5,000 to 10,000 acres) should contain at least 40% habitat suitable for dispersal. Dispersal habitat should have 40% canopy cover with clearance under the canopy averaging greater than 20 feet.

#### Timber Management

- \* Active timber management programs will be conducted, but will be implemented with regards to the objectives for maintenance of spotted owl habitat for dispersal.
- \* Retain 70 acres of NRF habitat around active nest sites up to 3 per township and associated with dispersal habitat.
- \* Integrate ("feather") stream, lake and other wetland protection zones into upslope prescriptions.

## Fire Management

- \* Retain standing and down, dead woody material in harvest units. Where possible plant through slash. Utilize slash burning prescriptions that maintain as much of the 100- and 1,000-hour timelag fuels as possible.

## Owl Management General Guidelines

Zone, Siuslaw National Forest \* Apply the same management prescriptions as in Connecting Habitat.

## Owl Management General Guidelines

Zone, California \* Apply the same management prescriptions as in Connecting Habitat.

## Management General Guidelines

Outside of the Owl Zone \* On Federal lands, no specific owl management direction. Follow existing land management plans for other resources.

## Management

- \* On lands other than those managed by federal agencies, develop and implement strategies from site specific plans to regional habitat management strategies.



### CHAPTER III. BIOLOGICAL FOUNDATION

The following discussion provides theoretical and empirical support for this multi-resource strategy. This chapter addresses several of the salient concepts described in the Thomas et al. (1990) conservation strategy, including provision for a well-distributed, interbreeding population, inclusion of large blocks of habitat, and recognition of the value of already-reserved suitable habitat.

#### Provision for a Well-Distributed Population

Large blocks of habitat currently capable of supporting multiple pairs are not available for the coastal forests from the Olympic Peninsula to sites in northwest Oregon. Thomas et al. (1990) pointed out that the few spotted owl pairs in those coastal areas appeared to be breeding less often than their counterparts in inland sites. Therefore, this multi-resource strategy emphasizes inland blocks of habitat where the owls appear to be most successful, and where maintenance of a relatively continuous population can be assured most effectively. De-emphasizing the coastal population north of Corvallis, Oregon does not significantly increase the risk to the species, because this multi-resource strategy proposes enhancing the effectiveness of habitat along the central system, resulting in a net gain. Furthermore, the strategy proposes stronger constraints in the owl management zone on the Siuslaw N.F., to the south.

Vertebrate species that evolved under conditions near carrying capacity apparently perform best at relatively high population densities (Fowler 1981). It is believed that northern spotted owls evolved under such conditions, which promoted territoriality, social facilitation of breeding, and density-dependent influences on reproduction and survival. By maintaining MPAs, this multi-resource strategy provides substantial opportunities for the owl metapopulation to function at levels at or near carrying capacity. Moreover, boundary processes, such as relatively short-term effects on predation rates and parasite loads, are reduced in a connected system of large and small blocks of habitat (Schonewald-Cox et al. 1983).

This relatively continuous distribution of large and small blocks is preferable to an even distribution of disconnected small reserves (e.g., SOHA concept, USDA For. Serv. 1988), and is likely equal to or even superior to a regular distribution of even larger blocks (i.e., Thomas et al. 1990) connected only by dispersal



habitat. Carey (1984) and Boecklen (1986) suggest that a mix of suitable environments and habitat sizes is likely to support a metapopulation with higher probability of long-term persistence than an environment comprised only of the most-preferred situations. This proposal, constructed in part from the author's interpretations of that and other literature, provides a greater mix of suitable environments and habitat sizes than do previously published strategies.

### Multiple-Pair Habitat Blocks

Thomas et al. (1990) proposed blocks of habitat (HCAs) capable of supporting  $\geq 20$  pairs of owls, to meet an objective of 15 pairs per HCA, assuming that not all habitat would be occupied at all times. However, some empirical information suggests that well-connected habitat is occupied to apparent capacity. For example, data contained in Meyer et al. (1991 in prep.) and BLM files point out that most sites surveyed in consecutive years on BLM lands in western Oregon show consistently high rates of occupancy by at least 1 owl ( $>75\%$ ), and  $>60\%$  for pairs. This has occurred in an area where the average amount of suitable habitat in a 500-acre circle circumscribed around owl site centers is about 31%. In this multi-resource strategy, the MPAs contain substantially more suitable habitat per pair.

Richter-Dyn and Goel (1972) developed a population-growth model that suggested a population size of 20 individuals provides a situation in which extinction is very unlikely and persistence time is immensely long. However, their model did not include stochastic (random) events, such as catastrophes, and it failed to account for immigrations to the population. While including immigrants would have countered the effects of stochastic population fluctuations to some degree, this strategy recommends placing little emphasis on unvalidated, theoretical models. Given the recent emphasis on concerns for long term persistence associated with isolated populations (several references described in Thomas et al. 1990), this strategy recommends that the MPAs not be isolated. Instead, this strategy recommends that MPAs be connected to each other via connecting and dispersal habitats so as to minimize the influence of stochastic events on a single MPA.

Haila and Hanski (1984) noted that an archipelago of interbreeding pairs of birds should be considered the relevant habitat landscape in discussions of long-term persistence. This multi-resource strategy, which includes a metapopulation of interbreeding pairs in more or less connected sub-populations of large and small groups, should provide a high probability of long-term persistence.

The Pimm et al. (1988) studies of birds on islands off the coast of Britain, found none of 7 populations of 11-16 pairs of

birds became extinct over a period of time greater than 50 years. If isolated island populations had such a high probability of persistence, a terrestrial population of 11-15 pairs connected with similar populations should have a probability of persistence (for  $\geq 50$  years) at least as high. In addition this multi-resource strategy recommends that these multiple-pair populations be connected by maintaining sufficient habitat to support single- or few-pair owl sites between them. This should occur because such a mix of multiple-pair blocks connected by few- or single-pair sites increases the likelihood for long-term persistence appreciably. This is true because the population will be more or less continuous, minimizing the need for demographic or genetic "rescue effects".

In addition it is worth noting that several isolated Mexican Spotted Owl (*Strix occidentalis lucida*) populations apparently have persisted for long periods of time in Arizona, suggesting that relatively small, isolated populations may have a relatively high probability of persistence. Certainly Mexican spotted owls are more similar ecologically to northern spotted owls than are the bird populations studies by Pimm et al. (1988). Although no studies have documented isolation is a problem for northern spotted owls, this strategy hedges against the potential for isolation problems by maintaining a continuous distribution.

#### Inter-MPA Distance (Owl Dispersal Capabilities)

In this proposal, owl distribution will be relatively continuous. Where the current distribution was discontinuous, this multi-resource strategy is careful to locate MPAs within known dispersal distances for juvenile spotted owls, or  $\leq 15$  miles. Distances nearer to 15 miles are recommended where intervening habitat is likely to support owl pairs and where MPAs are capable of supporting  $\geq 20$  pairs of owls. Shorter distances are recommended in situations with less suitable habitat or in conjunction with smaller MPAs.

In Washington and Oregon, all Reserved and Deferred MPAs are connected by a band of habitat twice the width of the average annual home range, which will be managed for nesting, roosting, foraging, and dispersal habitat to support additional pairs of owls. In California west of the coastal private lands, all habitat within the range for the northern spotted owl will be managed in this fashion.

Thomas et al. (1990) reported that 67.9% of dispersing juvenile spotted owls that were studied with radio-transmitters traveled 12 or more miles. This led to their recommendation to space HCAs a maximum of 12 miles apart, or within the dispersal distance for 2/3 of the juveniles. However, the proposal presented here supports a larger inter-MPA distance using approximately the



same criterion. Of the 56 juveniles reported in Thomas et al. (1990), 36, or 64.3%, dispersed  $\geq 15$  miles. The median dispersal distance was 17.5 miles, and the modal distance traveled was 15-19.9 miles. Therefore, this proposal approximates the dispersal distance for 64%, nearly  $2/3$ , of the radio-tagged juveniles studied.

Spacing MPAs  $\leq 15$  miles apart also is justifiable in view of the likelihood that radio transmitters reduced the average juvenile dispersal distances that have been observed. Thomas et al. (1990) reported unpublished studies that concluded that transmitters likely influence the reproductive rate and survival in adults in some areas. If transmitters affect adults, they are likely to affect survival of juveniles, which are smaller and less experienced in finding food and habitat. As a result, transmitters likely influence juvenile dispersal success, such that recorded estimates of dispersal distance may well be underestimated. Therefore, spacing MPAs by  $\leq 15$  miles should be well within the dispersal capability of juveniles in the natural population. Further, this spacing is supported by the establishment of suitable habitat capable of supporting individual pairs between MPAs.

#### **Maintaining A Connected, Interbreeding Population**

Numerous investigators (e.g., Harris 1984, Wilcove et al. 1986, Soule and Simberloff 1986) believe that populations that are continuous are more likely to persist than those that are separated, such as in island-like situations. This proposal maintains a continuous distribution of spotted owls, to the extent possible. On the other hand, the relative benefits of utilizing connecting habitat to link the MPAs can be debated. Thus, assessed in this section is the contribution of such suitable-habitat sites capable of supporting single or a few pairs of owls.

Although there is very little empirical information to provide guidance, Thomas et al. (1990) believed that juvenile spotted owls disperse in random directions, and thus are unlikely to use narrow corridors of suitable habitat that might link multiple-pair areas. However, juveniles do exhibit a tendency to use habitat in non-random fashion in their dispersal movements (Miller 1989). It is counter-intuitive to believe that an organism's movements would be fully random. At the same time, no documentation exists as to what extent both innate and learned behavior dictate dispersal in juvenile spotted owls. Also, while the need for connectivity among MPAs is intuitive, neither a strong theoretical nor empirical basis is available for developing supportable management policy for such connectivity. Therefore this multi-resource strategy recommends developing connectivity using more than one means, and evaluating the options as rapidly as possible. Possibilities include: using corridors of contiguous, suitable habitats that exist between some MPAs; managing intervening habitat using

innovative silvicultural practices; and maintaining suitable habitat between MPAs sufficient for individual breeding pairs.

Where little suitable habitat is available between adjacent MPAs, connections may not need to be wide corridors. Whitcomb et al. (1981) pointed out that connecting habitat need only possess some of the basic characteristics of the preferred forest situation to function as a conduit for population interchange. Thus, an alternative to preserved corridors includes providing strips of managed forests that contain some components of suitable habitat.

Such connecting habitat should contain forest in which owls can acquire prey to support their movements. Owls forage extensively in some forests as young as 25 years of age (Forsman et al. 1984). It is suggested that  $\geq 50\%$  of the strip should be comprised of foraging habitat; and, it would be most functional if it was maintained in approximately 40% or more canopy. This recommendation is based upon associations of radio-collared owls with relatively dense stand conditions, as reported in Thomas et al. (1990). Further, although Forsman et al. (1984) noted that spotted owls occasionally fly over large openings, pathways between MPAs probably should not have large uninterrupted openings.

Additional capability to support dispersal beyond the MPAs and single- or few-pair sites in this proposal is provided by late-successional patches that are to be reserved on U.S. Forest Service lands, Research Natural Areas, State Parks, and streamside management zones. Also, other areas where timber harvests are deferred due to technical reasons will aid juvenile dispersal. Miller (1989) observed dispersing juvenile owls that used such patches of habitat.

Also, connectivity between MPAs is aided in this proposal by maintaining habitats that are capable of supporting breeding pairs of owls in sites between the MPAs. Such areas of suitable habitat could act as corridors or stopover sites to support dispersing juveniles (Soule and Simberloff 1986). Such sites also might help to provide for a relatively large "floating" population of sub-adults and non-breeding adults. Floating adults help dampen the effects of fluctuations among the breeding population (Lande (1988)). Furthermore, such corridors of suitable habitat will aid conservation of biological diversity.

### Concern for Fragmentation Effects

Several investigators have hypothesized that forest fragmentation due to timber harvest may result in significant consequences to northern spotted owls beyond the effects of habitat loss. Thomas et al. (1990) cited Forsman et al. (1984), Ripple et al. (unpubl.) and Carey et al. (1989) as evidence for potential harmful effects to owls from forest fragmentation. With this in



mind, Thomas et al. (1990) recommended no timber harvesting in HCAs, at least initially. Assessed in this section, is the state of knowledge regarding effects of fragmentation separate from effects of habitat loss.

The primary basis for the hypothesized negative effects of forest fragmentation is the observation that home range sizes among spotted owls are larger in fragmented forests. Subsequently, it has been assumed that increased energy expenditures might result in reduced breeding success, and that fragmentation increases the risk of predation by great-horned owls or Northern goshawks. However, no study has determined if such increases in home range size negatively influence reproduction or survival. The primary difficulty with studies that attempted to evaluate the effects of fragmentation on spotted owls has been the inability to separate the effects of fragmentation from the simultaneous effects of reduction in amount of suitable habitat.

Caution must be employed in broadly applying concerns for the effects of forest fragmentation without experimental research evidence. Home range size is influenced by a host of factors (Boulanger and White 1990), including population density and food availability. For example, habitat reduction could result in displacement of some owl pairs, reducing average densities. Adjacent pairs may respond to the decreased densities by increasing home ranges to fill the vacated space, as has been documented for other territorial species (e.g., Hornocker 1970). Anecdotal observations show that, indeed, some spotted owls have expanded their ranges to include habitat recently vacated by birds that left their home ranges. The resultant increase in home range sizes was not associated with fragmentation.

The increase in home range size is often associated with an increase in acreage of old-growth within the enlarged home ranges (Irwin 1986). This suggests an ambiguity that there is a negative effect associated with home range size increase. Forsman et al. (1984) noted that spotted owls tolerate a considerable degree of fragmentation within their home ranges. Thus, conclusions relative to negative effects of fragmentation (beyond concerns about habitat loss) seem premature.

An ongoing study is attempting to clarify the effects of forest fragmentation on northern spotted owls in western Oregon. Meyer et al. (1991 in prep.) compared the effects of forest fragmentation and habitat conditions in concentric circles (0.5-, 1.0-, 1.5-, and 2.1-mile radii) between 50 random owl sites and 50 random landscape locations, and between 50 long-term-data owl sites and the 50 random owl sites, primarily on BLM lands in western Oregon. They analyzed data for the effects of several indices of forest fragmentation and habitat conditions on occupancy and reproduction among spotted owls.



First, Meyer et al. (1991 in prep.) tested long-term data for potential bias in the locations where owls are known to occur. Long-term-data owl sites were defined as those for which an adequate occupancy survey had been conducted in each of the five years from 1985 to 1989 (whether or not an owl was present). If data were biased, the interpretations would be suspect. Meyer et al. (1991 in prep.) determined that habitat conditions at long-term owl sites were not statistically different from those at random owl sites. However, they had no reliable method for determining whether or not most known owl sites on BLM lands, including the random owl sites, represent an unbiased sample of all existing owl sites (known and unknown).

After screening data for potential biases, Meyer et al. (1991 in prep.) found that for all 4 radii circles, the most statistically significant difference between randomly selected owl sites and randomly selected landscape locations was the percentage of old-growth forest. The statistical differences were most pronounced for circles with 0.5-mile radius (500 acre areas). On average, 0.5-mile circles at random owl sites contained 31.5% old-growth forest (155 acres), whereas random landscape locations contained 10.4% old-growth forest.

Meyer et al. (1991 in prep.) found no statistical relationship between several indices of forest fragmentation and reproduction or frequency of occupation by spotted owls, except in the Klamath Province in southwestern Oregon. There, reproductive success by spotted owls was correlated with the number of old-growth patches, percent hardwood habitat, and fractal dimension. Much of the Klamath Province has been managed using partial timber harvest practices, which may have resulted in a habitat mix (fractal dimension is increased) where the owls nest in remnant patches of old forests and capture much of their prey (especially dusky footed woodrats) in the managed sites. Also, recent telemetry information supports a conclusion that habitat selection includes a broader array of habitat conditions than in other areas (Zabel et al. 1991). Thus available information suggests, that suitable environments in the Klamath Province might include a mix of managed and retained forest sites.

Meyer's et al. (1991 in prep.) data suggest that successful occupancy of sites by northern spotted owls may be most influenced by amount and patch-size of suitable habitat within an area of 500 acres, and that suitable habitat may have some influence on spotted owls out to at least 2.1 miles from a center of activity.

Based on allometric equations that were developed from empirical information on home range sizes from the literature and which relate body size to home range size (Harestad and Bunnell 1979, Lindstedt et al. 1986) birds of the size of spotted owls and those with the same trophic status (predators) are predicted to occupy home ranges on the order of 500-700 acres. This information

supplements Meyer et al. (1990) findings. Therefore, MPAs that have sufficient habitat for a core area (at least 30% suitable within 500 acres) might include, in the future, harvest of timber beyond that restriction. Of course, such hypotheses would be tested in Research-MPAs.

## Federally Mandated Reserve Areas

Given the data available prior to 1990, both Thomas et al. (1990) and Anderson et al. (1990) concluded that spotted owl pairs that live in most reserved sites (Wilderness Areas, National Parks, roadless areas, Research Natural Areas, etc.) occur at higher elevations, and do not reproduce as well as those in non-reserved sites. They also noted that percent occupancy by owl pairs in reserved areas appeared less than that in non-reserved sites.

In the next several paragraphs, information is presented on relative occupancy and reproductive success by owl pairs in reserved areas that suggests earlier conclusions should be modified. Success of owl pairs is linked to amounts and distributions of suitable habitat, and significant amounts of such habitats occur in reserved areas (See also Appendix A).

The probability is high that the non-reserved sites were sampled more adequately for owls than sites in reserved areas, as explained below. The probability of detecting an animal occurrence is severely skewed by differences in sampling intensity, such that even averaging counts (occurrences per mile, e.g.) does not fully remove the bias (Sweeney et al. 1984).

Estimates of occupancy and reproductive success among pairs in reserved areas (cited in Thomas et al. 1990 and Anderson et al. 1990) probably underestimate the true values. First, the reserved areas with spotted owls appear to have been inadequately sampled, owing primarily to difficulty of access, more-restricted sampling along trails (often along noisy creeks), and USFS protocols that allow sampling in these areas during daylight hours by comparison to sampling primarily at night along roads in non-reserved areas. Also, an overnight stay (day/night/day) is counted as two visits in reserved areas, while visits must be separated by 5 days in non-reserved sites. Moreover, reproduction is recorded as zero if no owlets are found in 2 visits to reserve sites, while non-reserved sites are visited 4 times to make the same determination.

Second, reserve areas tend to be sampled for owls later in the reproductive season than in non-reserved areas. For example, sampling in remote wilderness sites frequently is delayed until late in the nesting season, to wait for snow to melt and streams to recede. In fact, many wilderness sites are not sampled until after mid-June, whereas non-reserved sites are sampled for reproduction beginning in mid-May. Calling responses by spotted

owls are reduced significantly in June and July by comparison to earlier periods in the reproductive season (Ganey 1990). Therefore, sampling later in reserved areas by itself could result in reduced estimates of occupancy and reproduction. In addition, estimates of reproduction may be reduced because some fledglings die before being counted, or move away from nest sites and so are more easily missed than fledglings in more accessible areas.

Only recently have research and monitoring efforts rigorously begun to examine spotted owls in extensive pristine forests in reserved areas such as wilderness and National Parks. For example, Roberts (1989) found high occupancy by California spotted owls (S. o. occidentalis) in Sequoia-Kings National Park, California, where 31 of 32 sites (97%) were occupied. Owl pairs there show similar reproductive rates to those in the adjacent National Forests (J. Verner, pers. commun.). Earlier owl surveys (1989) and ongoing (1990 and 1991) research documented as many as 50 sites occupied during the breeding period by 1 or more spotted owls within wilderness or other pristine areas in the Wenatchee and Okanogan National Forests, Washington (Irwin et al. 1991, unpubl. prog. rep., NCASI, Corvallis, OR).

Information from the Wenatchee/Okanogan study, a cooperative endeavor between the U.S. Forest Service and the National Council of the Paper Industry for Air and Stream Improvement (NCASI), indicates that 32 of 41 owl sites (78.1%) in reserved areas that were checked were occupied by 1 or more owls, whereas 31 of 44 sites (70.5%) checked in managed forests contained at least 1 owl (Table 1). Occupancy may not be significantly different in reserved and non-reserved areas for that region. Preliminary data for 1991 indicate rates that are nearly identical with those in 1990.

Finally, one should not draw the conclusion that most reserved sites with spotted owls occur above elevations at which spotted owls can be successful reproductively over the long run. In the cooperative NCASI/USFS study of owl population characteristics in wilderness areas and managed sites in the Wenatchee and Okanogan National Forests, Washington, the elevations of owl sites in reserved areas were not significantly different from those in commercial forests (Table 2).



Table 1. Occupancy of spotted owls in reserved vs.non-reserved areas in the Okanogan and Wenatchee National Forests, Washington, 1990.

	Reserved Sites		Non-reserved Sites	
	No.	%	No.	%
Unoccupied	9	22.0	13	29.5
Single owls	9	22.0	8	18.2
Pairs	23	56.1	23	52.3
Total	41	100.1	44	100.0

Information for 1991 is now available and indicates that 81% and 86% of unmanaged and managed sites contained at least 1 owl (Irwin, pers. commun.)

Table 2. Elevations (feet  $\pm$  s.d.) of randomly-selected spotted owl sites in wilderness areas and commercial forests in the Wenatchee National Forest and vicinity, Washington.

District	Wilderness		Commercial Forest	
	Elevation	No. sites	Elevation	No. sites
Lake Wenatchee	3430 $\pm$ 296	10	3533 $\pm$ 377	12
Leavenworth	3188 $\pm$ 648	14	3038 $\pm$ 686	12
Naches	3756 $\pm$ 358	15	3890 $\pm$ 584	15

Anderson et al. (1990) compared reproductive success of owl pairs in "good" habitat in Spotted Owl Habitat Areas (SOHAs) in non-reserved forest settings with that of owl pairs in randomly-selected, 1,000-acre sites in reserved areas (RSAs), regardless of habitat conditions. They found that the owl pairs in reserved RSAs reproduced less often than those in "good" habitat in forests available to commercial harvests. However, that comparison is

inappropriate because the reserved sites were from randomly-selected 1,000-acre sites that were not known to contain pairs or suitable habitat beforehand, whereas the "good" sites consisted of Spotted Owl Habitat Areas (SOHAs) that usually included 2,000 to 3,000 acres of suitable habitat, and most of which were known to contain at least 1 owl pair.

In his statistical review of Anderson et al. (1990), Sheriff (1991) noted that such a comparison with separate and unequal habitat class definitions (whole population vs. the best part of a nearly identical population) was inappropriate. Similarly, Simon-Jackson (1989) cautioned against such comparisons as Anderson's et al. (1990) that compared annual estimates for occupancy of owls in RSAs and annual point estimates for SOHAs.

Data from U.S. Forest Service monitoring programs in California and the Pacific Northwest provide information to test the hypothesis that owl pairs in reserved areas reproduce less often than those in suitable habitats in non-reserved lands. For 1988 and 1989 combined in California, 42% of 1000-acre RSAs in reserved areas contained pairs, and 83% of those pairs produced young, whereas 37% of non-reserved random sample areas contained pairs and 69% produced young (Simon-Jackson 1989).

For the USFS monitoring program in 1989 in the Pacific Northwest, 25% of reserved random sample areas contained pairs, 55% of which produced young (O'Halloran 1989). The corresponding values for non-reserved, random sample areas were not significantly different: 26% of sampled sites contained pairs, and 50% of the pairs produced young.

Information from the two USFS monitoring programs, therefore, does not necessarily support a conclusion that spotted owls living in appropriate amounts of suitable habitat in reserved areas generally exhibit reduced reproductive success in comparison to those in non-reserved areas. Reproductive rates in reserved areas were identical, and relatively high (averaging 1.7 fledglings per reproductive pair each year in each category [Irwin, pers. commun.]), compared to those in non-reserved areas in 1990 and 1991 in the Wenatchee and Okanogan study mentioned above. Northern spotted owls in reserved areas with sufficient habitat very likely reproduce often enough to contribute effectively to a persistent population.



## CHAPTER IV. SCIENTIFIC BASIS FOR SILVICULTURAL MANIPULATION

Previous proposals emphasized a slow approach to forest management to "maintain options for the future." Such conservative management results in inefficient use of the available forest resource for research, entails significant social costs, and may never fully balance human needs with environmental concerns. On the other hand, random trial and error is likewise not a reasoned approach to a complex issue. This section outlines a responsive, feed-back approach that could help integrate forestry and owls within a long-term conservation strategy.

### Developing Silvicultural Prescriptions

Perhaps the most innovative part of this multi-resource strategy includes applying information to most rapidly learn how to create suitable spotted owl habitat via silvicultural methods. This section provides scientific evidence that establishes a credible basis for potential silvicultural application.

Observations prior to 1989 of spotted owls using managed forests have been explained as anomalies (Simberloff 1987); expected random genetic or individual variation (Ruggiero et al. 1988, U.S. Fish and Wildlife Service 1989); or forced displacement as a result of logging in old-growth forests. Alternatively, some have stated that spotted owls are "adapting" to logging by using "second-growth" forest habitats. Wiens (1985) and Kenward and Widen (1989) provides alternative explanations of habitat selection that are more realistic.

Interpreting the appropriate forest conditions for the spotted owl in terms of silvicultural prescriptions requires an understanding of habitat selection theory. Ecological theory predicts that habitat selection is predicated upon "cues" to the optimal habitat conditions (Cody 1985, Janes 1985, Klopfer and Ganzhorn 1985, Rosenzweig 1985). The cues are identified by the process of habitat selection, which includes evolved behavioral mechanisms. The cues therefore are hypothesized to be correlated with factors that increase reproduction and survival. For spotted owls the habitat cues, although found most often in mature and old-growth forests, are contained within many managed forests.

Irwin (1987) and Thomas et al. (1990) noted that if the basic determinants of habitat selection (e.g., key structural and floristic elements) were provided, then spotted owls probably would successfully occupy managed forests. Until 1989, only anecdotal records were available of northern spotted owls breeding successfully within managed forests. Observations of spotted owls

in managed forests indeed are associated with structural features such as relatively large residual trees and snags, multi-layered stand condition, and woody debris (Irwin 1986, 1989). Those observations suggest that structure and composition should figure strongly in policy for maintaining a persistent population.

Observations of reproductively successful owls in managed forests support development of compatible silvicultural prescriptions. The observations include owls in Mixed Coniferous forests in northern California (Irwin et al. 1989a), an area at low elevations in western Oregon (Miller et al. 1991), the Olympic Peninsula (Thomas et al. 1990), and the eastside of the Cascades in Washington (Irwin et al. 1989b, Buchanan 1991); and in the Redwood/Douglas-fir and Coastal Redwood forests in California (Diller 1989, Kerns 1989, Pious 1989). These forests include small and large sawtimber coniferous stands, frequently containing mixtures of hardwood trees and understories. Many, but not all, contain residual structural features of previous stands. Some of the areas studied (e.g., Coastal Redwood) contain quite productive growing sites.

Carey (1984) pointed out that some field biologists hesitate to agree that direct habitat manipulation or retention of individual elements of preferred habitat types may provide high-quality habitats. However, past successes in wildlife management were gained through similar practices, as attested by the greater resilience, and even positive response, of many wildlife populations to natural and human-induced disturbance. For example, ferruginous and Swainson's hawks prefer native, climax grasslands in Saskatchewan and adjacent areas, but densities and reproduction are 50% higher in districts with a significant proportion of the land under intensive cultivation (Schmutz 1989). In that case, disturbed grasslands had higher net primary productivity that resulted in a larger and more diversified prey base. Kenward and Widen (1989) made similar observations for goshawks along forest edges, where prey was abundant.

The points described above are supported by studies of primary productivity in forests. Manipulation of primary productivity without significantly altering habitat structure may cause an increase in wildlife species number and diversity (Abramsky 1978). Increased primary productivity, and associated increases in prey abundance and/or diversity and/or availability, provides the best explanation for observations of successful breeding by spotted owls in relatively young (50-120 years) managed forests that contain appropriate structure. This speculation should be validated, however.

### **Stand-level Considerations**

It is prudent to examine suitability of older "second-growth"



forests to owls, and to use that experience as a basis for modified silviculture. Forsman et al. (1984) pointed out that young forests provided at least marginal foraging habitat after reaching 25-35 years of age, so stocking control, weeding, or fertilization might improve the ability of young forests to support spotted owls. Examination of stand-structural factors that influence spotted owl habitat selection should be completed across the full spectrum of successional stages, including a mixture of old-growth forests, mature forests, mid-successional forests, young regeneration stands, and clearcuts.

Such studies also should review the structural variation imposed by a variety of even-aged and uneven-aged silvicultural systems (e.g., high stand-level structural variation occurs following an intermediate cut in an irregular shelterwood system). Further, it may prove valuable to study owl response to a mixture of even-aged and uneven-aged silviculture as this may mimic gap sizes found in pristine forests. Thomas et al. (1990, Appendix S) noted that a combination of group selection and irregular shelterwood harvests appears readily adaptable to a variety of conditions potentially occupied by spotted owls.

Silvicultural accommodation of northern spotted owls in Douglas-fir/Western hemlock forests may require different prescriptions and/or technology than in mixed coniferous forests. Preliminary observations from ongoing surveys in young Douglas-fir/Western hemlock forests in western Oregon suggest that successful production of suitable owl habitat might require patches or individual large trees and snags (based on data from Miller et al. 1991), plus early control of stocking and composition.

### Landscape Considerations

Those included in the spotted owl/old-growth debate should recognize that application of any conservation strategy is experimentation at the landscape level. Current landscape proposals for a persistent spotted owl population were made using data collected from forest-stand level studies. Therefore, management agencies should employ landscape ecology concepts in research/management designs that ultimately look beyond spotted owls and also examine the feasibility of maintaining wildlife diversity in managed forests, with old-growth features an integral component as suggested by Thomas et al. (1990).

In certain areas spotted owls nest successfully in mixtures of small and large sawtimber and partial cutover stands with <10% old-growth (Irwin et al. 1989, Miller et al. 1991). Empirical information on reproductive rates suggests that owl pairs in some of these areas reproduce at rates higher than predicted on the basis of percentage of old-growth forests (e.g., Anderson et al. 1990). Perhaps this is due to the fact that these areas include

a wider range of successional stages than in previous studies, where little acreage existed in intermediate-aged and mixed-age forests. Spotted owls in parts of their range that have been partially harvested apparently maintain relatively small home range areas (Meslow et al. 1986, Miller et al. 1991). These relationships may occur due to increased prey abundance, such as dusky-footed woodrats (Tevis 1956), or as a result of increased primary productivity where structure was not dramatically changed.

## Partial Harvest Strategy

Anderson et al. (1990) recognized the value of partial-harvest strategies for some forests, but believed that only 5% of the forests are managed via partial harvests. Forsman et al. (1977) described 5 spotted owl pairs occurring in forests other than extensive old growth in northwestern Oregon. They noted that spotted owls typically roost in limby 2nd-growth trees, and that overstory removal cuts appear to have reduced effects on spotted owls compared to extensive clearcuts.

Many managed forests younger than approximately 40-50 years seem to lack structural and floristic features that apparently influence successful occupancy by spotted owls. Field observations suggest that these features include multi-layered conditions, flying space, large trees, snags, downed logs, and perch sites. The key features probably relate to the availability of nest sites and access to prey. Such factors have been shown repeatedly to regulate population trends in birds of prey (Newton 1979).

At least 2 recent studies have found evidence that the preferred prey for spotted owls may be relatively abundant in young forests (Anthony et al. 1988). In fact, populations of prey in some young forests have not been shown to be significantly different from those in old-growth. Prey may be unavailable to spotted owls in most young (<40-60 yr), even-aged forests because the dense, overlapping branches prevent access to prey. Thus, pre-commercial or commercial thinnings might improve habitats for spotted owls in young, dense forests by improving access to prey. A few nesting spotted owls found in managed forests in 1990 use sites that have been pre-commercially thinned (Irwin, pers. commun.)

Spotted owls appear relatively abundant in some mixed coniferous, mixed-age managed forests in parts of southwestern Oregon, northern California, and on the east side of the Cascades in Washington. Empirical evidence from Irwin et al. (1989a), Kerns (1989), Pious (1989), and from ongoing studies (Diller, pers. commun.), of relatively high densities and reproductive rates among spotted owls provides strong evidence that spotted owls are successful in some forests managed under partial cutting systems. Some of these areas have been managed continuously for timber



production for nearly 100 years, yet apparently contain reproductively active owl pairs in moderately high densities.

In addition, based on approximately 5 years' of evidence, spotted owls consistently have reproduced successfully in managed, mixed coniferous forests on the eastside of the Cascades in Washington state. There, dominant trees primarily include residuals from previous logging, many of which were 50-70 years old at the time of logging. Mixed-age forest types occupied by spotted owls were created initially by extensive wildfires, windstorms, and extensive timber management practices, including partial harvests, which perpetuated/promoted the complex structural features often found in older forests. Biologists do not yet know if owls occupied those sites continuously, or if they colonized the sites after a period of development. However, it is clear that some of those sites have been converted, through forest management and fire exclusion, from savannah-pine-types, which probably were not suitable for owls historically.

Data from northern California (Irwin et al. 1989, Kerns, 1989, Pious 1989) provide additional support for a conclusion that suitable spotted owl habitat is broader than mature and old-growth forests (Table 3). Spotted owls are well-distributed across managed, private lands in northern California. Spotted owls have nested successfully in regenerating forests as young as 30 years post-harvest in Coastal Redwood forests. Timber-harvest practices that maintain relatively dense (>40-50%) canopies of conifers and hardwoods and retain scattered large trees and snags or clumps of such trees and snags, downed logs, multi-layered conditions, or result in such structural components over time, apparently allow for recolonization after 3-5 decades (Irwin 1989).

Spotted owls that occur on managed forest lands in some sites in northern California may be present because the forest management practices retained hardwood understories. Hardwood stands result in a cooler operative thermal condition than open-canopy stands. Major spotted owl roosts are located in hardwood understories of conifer stands in California (Barrows and Barrows 1978). Mature stands of Douglas-fir with no hardwood understory are not used for roosting.

In selectively-managed forests with mixed sizes and age classes represented, cone and mast crops, which most likely support populations of some of the owl's prey, may be more consistent than in monotypic, even-aged stands. Also, multi-layered forest conditions can be perpetuated through time in managed forests. Dusky-footed woodrats (Neotoma fuscipes), the owl's primary prey in southern Oregon and northern California, occur abundantly in both very young and old natural stands (Raphael and Barrett 1983). And 26% of the telemetry locations of spotted owls in one study in that area occurred along forest/brush-stage clearcut or other interfaces (Solis 1983). Also, northern flying squirrels

(*Glaucomys sabrinus*), an important prey item, appear to be relatively abundant in mid-successional forests (Raphael et al. 1986).

The information discussed above suggests that suitable spotted owl habitat might be expected to "move" across a managed forest through time: recently treated stands with adequate nest tree retention grow into suitable condition as currently occupied habitat is harvested. Therefore, an ability to predict and track such habitat changes would be useful. Thomas et al. (1990) discussed the utility of Geographic Information Systems and computer habitat models in simulating habitat conditions over time, and discussed the need for timber-harvesting schedules that would be constrained by patch-size and habitat amounts. New models now are available that can schedule timber harvests with explicit spatial constraints (e.g., O'Hara et al. 1989). Such models can treat harvests as integral units in any combination specified by the user, and could facilitate proactive forest management for the spotted owl.

Table 3. Summary of Spotted Owls observed on private lands with 30-80 year-old forests in northern California, 1989.

Author	No. owl sites	Occupancy Data			Reproduction Data			
		sites checked	pairs found	%	pairs checked	No. breed. %	young found	
Irwin et al. 1989	182	83	63	76	55	28	50.9	37
Kerns 1989	22	22	12	54	5	5	100.0	0 <sup>a</sup>
Pious 1989	80	31	25	81	25	8	32.0	11
Total	284	136	100	74	85	41	48.2	48

<sup>a</sup>Several young apparently were produced, but died due to predation and/or a severe storm on Memorial Day 1989.

## CHAPTER V. ADAPTIVE MANAGEMENT

Previous conservation strategies for spotted owls lacked objective strategies for comparing alternatives. Comparing alternatives can identify the optimal process to blend protection for the owl with goals for other resources. This hasn't been done because of a high degree of uncertainty as to the optimal (as opposed to "best") conservation strategy. Also, there is no reliable process that could test if the previous proposals truly optimized resource outputs in comparisons among alternatives. Such a process requires an analysis of decision-making risk and biological risk as well as a directive for rapidly gathering new knowledge.

Biological uncertainty and concern for people have resulted in this proposal for a dynamic conservation strategy--one that can simultaneously achieve the goals of maintaining a viable population of northern spotted owls and a sustained yield of forest products. Ultimately, a long-term program can be achieved through provision of answers to critically important questions. Answers might lead to changes in the way that forests are managed.

This multi-resource strategy recommends actively applying adaptive management principles. Active adaptive management includes the following: (1) implementing more than 1 alternative or operating management hypothesis on an experimental basis (i.e., 8-12 years) and comparing the owl's responses with predicted results; and (2) providing varying levels of sufficient habitat for individual owl pairs in certain Research-MPAs or in the owl management zone outside of MPAs and the central secure system, providing the most rapid means of testing innovative forestry practices. Thus, active adaptive management could simultaneously evaluate alternatives, quantify the risk to the owl and other resources, and monitor and refine the conservation strategy by conducting management experiments at stand- and landscape levels.

The operational goal is to document how, where, and under what conditions various forestry practices influence numbers and distribution of spotted owls; and to learn from that experience. This multi-resource strategy recommends agencies address the broad question, "How can forest management be applied to the existing landscape such that management systems simulate, if not mimic, natural ecosystem processes?" Well-designed management experiments will produce much greater scientific understanding than conservative management and basic research (MacNab 1983, 1985; Walters 1986; Eberhardt 1988; Irwin et al. 1989a).

High priority must be accorded to research/management topics that compare predictions and assumptions within the proposed



conservation strategy and alternative landscape options and stand treatments. Alternative landscape options might include varying the distances between MPAs in relation to size of MPA, and evaluating sites in the general forest that contain varying levels of suitable habitat that may support breeding pairs.

Further, the potential value of actively creating the stand or landscape conditions required for valid tests of certain predictions of the conservation strategy should be evaluated. For example, experimental designs might be created with replicates of forest stands with specified levels and arrangement of suitable habitat. Another example would include capture and transfer of owl pairs to test density-dependent effects on reproduction and survival. Such information is vital in population/habitat modeling and in understanding the potential effects of "packing".

From the available research completed to date, the following observations can be made: (1) the responses to management by northern spotted owls will only be clearly evident on large spatial and/or temporal scales; and (2) the basic biological processes involved should be the subject of significant research investment (eg., predator-prey relationships). Therefore, this multi-resource strategy suggests the following general research topics within which testable null hypotheses could be developed.

- (1) densities, demography (and variation in parameters), and habitat conditions for spotted owls in reserved and other pristine areas (probably those that are larger than 10,000 acres);
- (2) the rates of interchange of juveniles among the mix of MPAs and managed forests; and
- (3) spatial-inferencing models which use Geographic Information Systems (GIS) that incorporate spatial pattern algorithms and successional-stage tracking over time.
- (4) the response of spotted owls to silvicultural manipulations, such as thinnings and fertilization in dense, young forests.
- (5) prey-base responses to alternative forestry practices designed to improve habitat (e.g., large cone crops, leaving snags and downed logs); and ability of owls to capture prey (energy gained vs. energy expended) among alternative stand conditions.
- (6) population viability analyses that account for recolonization of suitable habitat as it re-grows and which also recognize the separate contribution to viability that is provided by owls in dense, multiple-pair sites and those in less-dense, managed sites.



- (7) proactive management practices such as the optimal number, configuration, and arrangement of nest boxes that facilitate nesting by owls in managed sites; or captive breeding programs that not only provide for transplants to unoccupied areas but also for evaluation of energetic requirements for optimal growth and reproduction.

The topics suggested above seem warranted because current rates of occupancy and population fitness are unknown for areas reserved from timber management, and poorly known for managed landscapes with forests that contain 50-120 year-old trees (particularly those with remnant patches or scattered individuals of older forests). Also, management experiments should be designed to test and refine the habitat capability model in the U.S. Forest Service's SEIS (USFS 1988). Moreover, spotted owl monitoring programs can distinguish problem areas, as well as point to population improvements as forests develop within the different physiographic provinces.

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**APPENDIX A. ANALYSIS OF OCCUPANCY RELATIVE TO SUITABLE HABITAT AND ADMINISTRATIVE STATUS (RESERVE VS. NON-RESERVED SITES)**

Thomas et al. (1990) developed logistic regression equations which predicted the probability of occupancy by owl pairs was lower on 1,000-acre random sample areas (RSAs) in reserved forests than in similar sized tracts in commercial forests. However, the regression equations inadvertently may have been biased by sampling more heavily in non-reserved sites. Table 1A shows that 1,000-acre RSAs in reserved areas with >50% suitable habitat had probability of pair occupancy that was similar to RSAs in non-reserved sites in 1988 but not 1989.

Testing this concept further requires a re-examination of the strength of the statistical relationship between probability of occupancy by owl pairs and (a) acreage of suitable habitat and (b) status in reserved or unreserved location. This was done with information from the Spotted Owl Research, Development, and Application (RD&A) Program from monitoring of RSAs; which had been given to the ISC, but had subsequently been corrected for a few clerical errors. Another difference between the analysis presented here and that of ISC is that this analysis excluded latitude of sites that were sampled for owls. The differences, which slightly modify regression coefficients, are not significant to the purposes here.

Table 1A. Occupancy by Spotted Owl pairs in Regions 5 and 6, U.S. Forest Service, in 1,000-acre randomly selected survey sites with over 50% suitable habitat (from regional monitoring programs).

<u>Non-reserved sites</u>				<u>Reserved sites</u>			
		%				%	
Sample size	pairs	occupied		Sample size	pairs	occupied	
<u>1988 Data</u>							
R-5	15	7	47	6	4	67	
R-6	26	5	19	28	7	25	
Total	41	12	29	34	11	32	
<u>1989 Data</u>							
R-5	17	7	41	25	5	20	
R-6	25	8	32	23	6	26	
Total	42	15	36	48	11	23	



Logistic regressions were used including an algorithm algebraically identical to that used by the ISC, but which predicted the probability of presence rather than absence:

$$\text{Pr}(\text{presence}) = 1 \times (1 + \exp^{-(b_0 + b_1x_1 + b_2x_2 + \dots)})^{-1}$$

The following analysis does not allow a conclusion that owl occupancy in reserved RSAs is particularly different from those in non-reserved situations. The data indicate that the amount of suitable habitat has a statistical relationship with the probability for detecting at least 1 owl. Large sample sizes apparently influenced the analyses, because, although the relationship with suitable habitat is real, that relationship also is rather weak.

First, the logistic using 1988 data showed:

Variable	Coefficient	P-value	R-square
Intercept	-0.973	0.001	0.057
Status	-0.888	0.012	0.034
Suitable acres	0.004	0.000	0.137

Model interpretation: the probability of detecting owls increased with: (a) amount of suitable habitat; and (b) location in non-reserved lands (reserved status was coded as a 1).

The statistical relationship was weak, since only 13.7% of the variance in probability of detecting at least 1 owl was accounted for by the regression model. Chi-square analysis indicated that the probability of correct classification of occupancy based on suitable habitat and administrative status increased by 18.3% over a random probability of guessing the correct classification. Adding latitude may have increased the percent of correct classifications.

For the logistic analysis of the 1989 data:

Variable	Coefficient	P-value	R-square
Intercept	-0.862	0.013	0.043
Suitable acres	0.002	0.002	0.063

Model interpretation: the probability of detecting at least one owl increased with the amount of suitable habitat.

Status in reserved or non-reserved location was not statistically significant in the analysis; the statistical relationship was quite weak: only 6.3% of the variability in the probability of detecting an owl was accounted for by the model. The model increased the percentage of correct classifications to 60.7%, or about 11% better than a 50:50 (random) chance.

## APPENDIX B. MONITORING STRATEGY FOR MANAGED FORESTS

Suitable habitat can be described at the landscape scale and created through judicious planning and implementation of forest management practices over time and space. In a landscape sense, suitable spotted owl habitat is defined as an area approximately the size of a pair's home range that includes a mosaic of forest stands that allow continuous occupancy and regular successful reproduction. This assumes that descriptions of landscapes known to support successful reproduction by owl pairs can be used as a template to maintain and/or create suitable owl habitat in managed forests. This philosophy creates opportunities to implement and test a variety of management options within a dynamic conservation strategy. Of course, research must verify that reproduction is sufficient to replace or exceed mortality.

The objectives for monitoring include the following:

1. Test (validate) the assumptions used in development of the multi-resource strategy.
2. Provide an efficient feedback mechanism that adjusts the strategy (more or less protection, e.g.) as new information is developed.
3. Develop and test options for creating and maintaining northern spotted owls and their habitats in managed forests.

This multi-resource strategy assumes that there will be a relationship between the need for independently stable MPAs (including size, spacing, and distribution) and the levels of protection that are provided for owls and their habitats in the general forest. Here, general forest includes managed sites that are outside the central system of continuous distribution of spotted owls. Clearly, dispersing juveniles from the general forest will be able to colonize reserved areas, and vice versa. Therefore, reducing the intensity of forest management in the general forest could be a means for reducing the amount of habitat needed within the system of MPA reserves. The multi-resource strategy further assumes that such activities can be done without significantly increasing the risk of extinction or local population decline.

In addition to questions raised in Appendix R of the ISC Report, specific questions that can be answered by monitoring owl responses to implementation of this multi-resource strategy include the following:

1. Are occupancy and reproductive rates of owl pairs the same in Deferred and Research-MPAs as they are in the general forest?

2. Does juvenile dispersal success and recruitment of subadults differ between MPAs and the general forest outside of MPAs?
3. Does occupancy rate vary with size of MPA?
4. Does population growth rate vary by size of MPA, and do these vary between Deferred and Research-MPAs?
5. Does a lack of nesting structures limit owl distributions in managed forests?
6. Do spotted owls occurring in areas with small patches of suitable nesting habitat surrounded by suitable foraging habitat reproduce as often as those with extensive amounts of suitable nesting habitat?
7. Is successful dispersal related to the distance between MPAs?
8. Do fledgling spotted owls imprint on their natal habitats, such that they seek similar habitats as adults?

## APPENDIX C. MULTI-RESOURCE STRATEGY STATISTICS

### MPA Size

Appendix I of Thomas et al. (1990) explains the methodology used by the Interagency Scientific Committee in determining the minimum size of their Habitat Conservation Areas (HCAs). To the average home range size for spotted owls in each of six major geographic provinces, they applied a 25% reduction to account for overlap in home ranges of adjoining pairs. This resulted in the following equation:

$$\text{HCA size} = (\text{Number of owl pairs}) \times (\text{Median annual pair home range size}) \times (0.75).$$

Using this formula and the median home ranges for each province (Thomas et al. 1990, Appendix I, Table I1), the following minimum acreages were determined for multiple pair areas:

Table 1C.

State	Province	10-Pair	15-Pair	20-Pair
Washington	Olympic		111,720	148,960
	Cascades		70,965	94,620
Oregon	Cascades		33,240	44,320
	Coast		53,625	71,500
	Klamath		37,530	50,040
California	Klamath	22,470	33,705	44,940

Few areas are 100% suitable spotted owl habitat. And, spotted owls include both suitable and non-suitable habitats in varying amounts within their home ranges (See Thomas et al. 1990, Appendix I, Table I2). By basing area calculations on the average of the home ranges demonstrated by owls in each province, an allowance for non-suitable habitat is automatically incorporated into the final figures. This has the advantage in that the proportionality so incorporated is one defined by spotted owls in each province, rather than an artificial estimate. In the few cases where significantly large blocks of unsuitable acreage exist (lakes etc.) within an MPA, additional suitable habitat was incorporated.



## Future Owl Pairs

The following estimates are very general, and are provided only for relative comparisons. No boundaries on the enclosed map, or for that matter MPA locations, are so critical that they cannot be changed within the overall framework of this strategy.

While the numbers of owl pairs that will be maintained in the future in reserve areas and MPAs are "very general", the number of owl pairs supported through forest management in the owl-management zone outside of the MPAs is even more variable. However, it is important to recognize that numerous spotted owl pairs will be maintained in this zone. Therefore, the following range is provided as a best educated estimate, realizing the actual number could be considerably different: This multi-resource strategy should at a minimum provide for an additional 750 owl pairs in the owl management zone outside of the reserves and MPAs. This number may be 1,100, or it may be considerably higher, particularly given time and experience with forest management for spotted owls.

(The data presented in Table 2C. does not reflect updated mapping on U.S. Forest Service Lands. This table will be revised as information becomes available from the agency.)

Table 2C.

<u>State</u>	<u>Reserved Areas (Acres)</u>		<u>MPAs (Acres)</u>		<u>Estimated Owl Pairs</u>
	<u>Congress.</u>	<u>Admin.</u>	<u>Deferred</u>	<u>Research</u>	
Washington	1,057,100	227,550 <sup>a</sup>	416,950	327,550	400-450
Oregon	478,300	138,600	362,100	331,500	600-650
California	664,200	0 <sup>b</sup>	164,800	233,400	250-300
Total	2,199,600	366,150	943,850	892,450	1,250-1,400
Estimated Pairs in the General Forest, Owl Management Zone					750-1,100
					-----
Total Estimated Owl Pairs					2,000-2,500

<sup>a</sup>These acreages are conservative figures. According to information from the U.S. Forest Service (pers. commun.) there are over 2 million acres of administratively reserved suitable spotted owl habitat on the National Forests in Region 6. Some of this already may be accounted for in either the Deferred or Research-MPA acreages above, but not all.

<sup>b</sup>At the time of this writing, December 1991, there were no final forest plans in northern California. Therefore there were no decisions made concerning administratively reserved areas in this region.

## APPENDIX D. GLOSSARY OF KEY TERMS

**General Forest Owl Management Zone** - All forested land areas outside of reserved areas or multiple pair areas, and lying between MPAs or adjacent to this central system of reserves and MPAs as delineated in yellow on the enclosed map. Within this zone, active timber management programs will be conducted, but will be conducted with regard for the maintenance (and in some cases development) of spotted owl habitat. This area would have two levels of forest management for spotted owl habitat, with sites along the central system and between MPAs receiving the higher level of attention.

**Connecting Habitat** - A band of habitat between two Deferred/Reserved MPAs equal to twice the width of the average annual home range. This is intended to support additional breeding pairs in a managed network of nesting, roosting, foraging, and dispersal habitat and to provide connectivity between the Deferred/Reserved MPAs.

**Central System of Secure Habitat** - A band of forest providing for a continuous, well distributed, population of breeding pairs of spotted owls. It is comprised of all Reserved and Deferred MPAs plus Connecting Habitat.

### **Multiple Pair Areas:**

**Deferred-MPA** - An area of suitable spotted owl habitat (as defined by USFS maps) within the continuous central distribution of spotted owls where timber harvests on federal lands are to be deferred until such time that research documents silvicultural practices that are compatible to product extraction and the maintenance of spotted owl habitat. For the most part, these areas have been recommended at a size to support  $\geq 20$  pairs of owls alone or in combination with a Reserved MPA.

**Research-MPA** - An area of suitable spotted owl habitat (as defined by USFS maps), somewhat separated from the continuous north-south central system of reserves and deferred MPAs, that will be utilized to evaluate silvicultural treatments on spotted owl habitat through designed research. Such areas will be situated in representative suitable habitat types, and in areas of known owl density to provide sufficient replication for making valid inferences about spotted owls as influenced by land management.

## **Reserved Areas:**

**Administratively Reserved Area** - An area of suitable spotted owl habitat (as defined by USFS maps), that has been set aside (reserved) through administrative action by the U.S. Forest Service (e.g., Research Natural Areas, Roadless Areas, streamside and visual corridors, etc.).

**Congressionally Reserved Area** - An area of suitable spotted owl habitat (as defined by USFS maps), that has been set aside (reserved) through legislative action (e.g., National Parks, Wilderness Areas, National Recreation Areas, etc.).

**Suitable Habitat:** "Suitable" habitat for the spotted owl varies by state and province. The definitions given here are provided as general statements and are not meant to be strictly regimented guidelines. These may differ from those used by the Forest Service, BLM and state agencies.

**Nesting Habitat** - Spotted owls nest in a wide variety of sites, although some factors appear to be rather specific. Spotted owls are opportunistic nesters, so they are dependent on naturally occurring features such as broken-topped trees or snags, tree cavities, or a platform of some type (i.e., mistletoe broom, abandoned bird or mammal nest). Nest stands should contain at least several such nest structures, usually in large diameter trees. Canopy closure over the nest site should average over 80% (50% to 100%). Horizontal vegetation density and stand size vary. These elements become more important with increase in the amount of non-forested area surrounding the nest stand. Nests are found most frequently at mid-slope or lower.

**Roosting Habitat** - Roosting habitat should be large enough to provide several roosts with variable heights and locations to permit owl behavioral response to environmental changes (temperature, wind, precipitation) and predators. Canopy closure is generally greater than 40% (range 10% to 100%). Height and diameter of roost trees is highly variable (average height = 55', ranging 9' to 205'; average diameter = 18", ranging 2" to 92"), but should be large enough to keep the bird off the ground.

**Foraging Habitat** - Requirements for foraging habitat are quite flexible. Of importance is the presence of perches from which to hunt, and a relatively open mid-story to permit efficient soaring and attack. Prey abundance is also important. The presence of down woody material is

believed to be a key habitat element for prey, and therefore may be an important factor in owl foraging habitat.

**Dispersal Habitat** - This is the most varied, consisting of a few perches for temporary resting and sufficient forest cover to provide protection from predation. Adequate space needs to be present in the stand to facilitate soaring. Tree diameter is not important except as it relates to overall tree size (large enough to provide cover, and free enough of lateral branches to permit soaring).



## **APPENDIX E. MAPPING CRITERIA**

The following criteria were used to map the Multiple Pair Areas, Connecting Habitat, and Owl Management Zones identified in this Alternative.

### **IDENTIFY CURRENT STATUS OF HABITAT AND OWL LOCATIONS**

1. Identify all nesting, roosting, and foraging (NRF) habitat that is within congressionally set-aside areas.
2. Identify all NRF habitat within areas identified as non-suitable for timber production in the selected alternative of the final forest plans, or draft plan if the final is not available.
3. Identify all lands which are not capable of growing NRF or dispersal habitat.
4. Identify all known locations of pairs and resident owl singles.

### **DETERMINE THE MINIMUM SIZE OF THE MULTIPLE PAIR AREAS (MPAs)**

The size of areas capable of supporting 10, 15 and 20 pairs is determined using the procedures documented on page 198 of the ISC Strategy. These are listed in Appendix C of the Multi-Resource Strategy (MRS).

### **MAP THE MULTIPLE PAIR AREAS**

Starting at the US-Canadian border, define areas large enough to support a minimum of 20 pairs per area in Oregon and Washington and 10 pairs per area in California that are no further than 15 miles apart in Oregon and Washington and 12 miles apart in California. Every effort should be made to incorporate as many known pairs and resident singles as possible.

Select lands within congressionally and administratively withdrawn areas making sure that at least 40% of the area is currently NRF habitat and that the majority of the remaining area is capable of growing into NRF or dispersal habitat. Incorporate the maximum number of known pairs and single owls possible.

Next include land within areas which have been assigned in the final forest plans as Regulation Class 3 (long rotation) using the same criteria as above.

Last include areas in Regulation Classes 1 and 2 using the same criteria as above.

### MAP THE RESEARCH-MPAS

The actual number and locations of research areas will be determined by the Research Committee. For the purpose of this analysis only, the following criteria were utilized recognizing that other configurations exist.

1. Areas must be large enough to support 15 pairs per area in Washington and Oregon and 10 pairs per area in California.
2. Areas should be between 7 and 15 miles from the central secure system or another Research-MPA in Oregon and Washington and 5 and 12 miles in California.
3. Areas must contain at least 40% NRF habitat.
4. Areas should currently contain at least 10 pairs or resident singles per area in Oregon and Washington and 7 pairs or resident singles per area in California whenever possible.
5. Each province must have at least one Research-MPA.

### MAP THE CENTRAL SECURE SYSTEM

1. Connect the Reserved and Deferred MPAs with a band of land equal to twice the diameter of the average annual home range size by province.
2. Map this to include the maximum amount of current NRF habitat and owl pairs and resident single.

### MAP THE OWL MANAGEMENT ZONE

1. Within Oregon and Washington, define the owl management zone as that area necessary to enclose all MPA's
2. Within California the zone includes all lands within the owl's range east of the coastal private lands.

APPENDIX F. NFPA/AFC WILDLIFE COMMITTEE

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# L

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## Appendix L

### Response to Public Comments



# Appendix L

## Response to Public Comment

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### Introduction

The public comment period on the Draft Environmental Impact Statement on Management for The Northern Spotted Owl in The National Forests began on September 27, 1991, and closed on December 27, 1991. Agencies, officials, and members of the public were invited to comment on the Draft Environmental Impact Statement. Hearings were held by the USDA Forest Service in Olympia, Washington; Salem, Oregon; and Redding, California. In addition to the hearings, the public was invited to provide the Forest Service with written comments on the Draft Environmental Impact Statement.

A total of 163 individuals gave testimony at the three public hearings, 35 in Olympia, 87 in Salem, and 41 in Redding.

There were a total of 5,231 written public comments submitted. Of those, 491 were individual letters, and 4,576 were postcards.

The break down of those submitting written comment is as follows:

	Letters	Postcards
Federal Agencies and Elected Officials	4	
State Agencies and Elected Officials	3	
American Indian Organizations	1	
Cities/Counties/Schools/Locally Elected Officials	6	
Businesses	43	39
Interest Groups (industry and environmental)	67	1
Individuals	367	4,536

Of those respondents expressing an alternative preference among those presented in the Draft Environmental Impact Statement, 32 favored Alternative A, 16 favored Alternative B, 34 favored Alternative C, and 148 favored Alternative D. Many more postcards and letters were received urging the Forest Service to consider the Multi-Resource Strategy.

The Council on Environmental Quality regulations for implementing the procedural provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508) state, "Comments on an environmental impact statement or on a proposed action shall be as specific as possible and may address either the adequacy of the statement or the merits of the alternatives discussed or both." (40 CFR 1503.3) Comments and responses in this section are based on those types of specific comments, "which proposed to: (1) modify alternatives including the proposed action, (2) develop and evaluate alternatives not previously given serious consideration, (3) supplement, improve, or modify its analysis, and (4) make factual corrections," (40 CFR 1503.4).

## Appendix L

Letters and postcards containing the types of substantive comments described above were forwarded to the interdisciplinary team for review. The interdisciplinary team grouped similar comments and prepared statements which reflect the concerns expressed. The following sections contain those statements and the responses to them.



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Appendix L-A  
**Comments and Responses**



## A. Comments and Responses

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### The EIS Process

#### Viability and Management of Other Lands

- **Comment:** The Forest Service should develop a management plan for the management of habitat on other ownerships as well as for the National Forests.

**Response:** The Forest Service has no jurisdiction to direct the management of lands other than those, such as National Forests, National Grasslands, and some National Monuments, that are specifically assigned to the Agency by Law or Executive Order.

- **Comment:** Considering that the Forest Service does not manage all the habitat, or even all the Federal habitat, it is questionable whether the agency can assess the viability of the owl for its own alternatives.

**Response:** How other land managers manage spotted owl habitat is important but not within the Forest Service's jurisdiction. In assessing viability it is assumed that other Federal land managers will comply with Section 7(a), and private and other landowners will comply with Section 10, of the Endangered Species Act.

The northern spotted owl is listed as a Threatened subspecies; the effect of the management direction presented in these alternatives on the viability of the entire subspecies is of concern to the public and the Forest Service. Therefore, the viability analysis in this FEIS assesses the effect of the alternatives (which provide management direction for National Forests lands only) on the long-term viability of the northern spotted owl as a subspecies in the planning area.

This viability analysis of the subspecies is appropriate because 1) the viability of populations outside the National Forests contribute significantly to a well distributed viable population in the National Forests, 2) the CEQ regulations implementing NEPA Section 102 (40 CFR 1508.25(a)(2), 1508.25(c) and 1508.7) require the analysis and disclosure of consequences outside the immediate site or planning area, and 3) the Endangered Species Act (Section 7(c)(1)) requires a biological assessment to identify the effects of an action on a Threatened, Endangered, or Proposed Species. (The biological assessment may be undertaken, as it was in this case, as part of the environmental impact statement.)

The U.S. Fish and Wildlife Service, under the authority of Section 7(a) of the Endangered Species Act, is responsible for evaluating whether or not a threatened species is jeopardized by another Federal agency and that its critical habitat is not destroyed or adversely modified. That responsibility is the basis for assessing the effect of the alternatives in this FEIS on the viability of the northern spotted owl.

This environmental impact statement uses the assumption that other lands will be managed in accordance with Section 7(a) or Section 10 of the Endangered Species Act. Specifically, it is assumed that as a result of consultation with the U.S. Fish and Wildlife Service other Federal agencies will manage their lands with a level and pattern of owl habitat protection necessary to meet the requirements of the Endangered Species Act and comparable to that presented in the ISC Strategy. This assumption is based on the record of consultation and opinions issued by the U.S. Fish and Wildlife Service in the last two years and on compliance by other agencies.

The other Federal land management agencies have managed their lands in accordance with the opinions of the U.S. Fish and Wildlife Service and in accordance with the Endangered Species Act. It is true that the Bureau of Land Management in Oregon, after receiving "jeopardy opinions" on 44 proposed timber sales, applied for an exemption from the requirements of the Endangered Species Act under the Act's provisions of Section 7(g). The Endangered Species Committee has yet to rule on this application. A decision is expected in the first half of 1992. The Bureau of Land Management has not made any irreversible or irretrievable commitments of resources which would foreclose management of the habitat in accordance with the U.S. Fish and Wildlife Service's recommendations.

Should the Endangered Species Committee grant an exemption to the Bureau of Land Management and the spotted owl habitat on the lands it manages is adversely modified, this new information would be a cause for reexamining the effects on the viability of the spotted owl as a subspecies and reexamining the management direction for its habitat on the National Forests.

Where the management of owl habitat by other managers is especially crucial to the viability of the northern spotted owl, it is identified in the environmental impact statement, along with the consequences should those management assumptions not be met.

### Reexamine Decisions Made in Forest Plans

- **Comment:** The Forest Service should reexamine the decisions made in the Forest Plans.

**Response:** The sections on Implementation in Chapter 2 of this document note that Forest Plans would be adjusted either as part of the normal process of amending or revising Forest Plans, or specifically in response to new information or requirements.

Alternatives B, C, D, and E all amend the standards and guidelines for the management of northern spotted owl habitat in Forest Plans as they exist (or are being completed). The standards and guidelines for Alternatives B, C, and D require that if timber harvest rotations or lands reserved from timber harvest were altered (other than as part of the management direction here), the standards and guidelines would have to be reexamined for their effects on the spotted owl's viability. Alternatives B, C, D, and E are based on the assumption that Forest Plans will remain unchanged (except for the management direction in this document) until management and scientific data and the adaptive management process, or the Forest Plan amendment or revision process, result in change. That change would be analyzed for its impact on the viability of the spotted owl.



- **Comment:** Each Forest Plan should be evaluated separately.

**Response:** The "Implementation" section for each alternative in Chapter 2 indicates that each involved Forest Plan will be evaluated when the Recovery Plan is issued. The Recovery Plan is expected in mid-1992.

- **Comment:** Since 50 percent of the National Forest is already set aside from logging, the remaining 50 percent should be used for wildlife and should allow timber harvesting.

**Response:** All of the alternatives attempt to make as much use of Reserved Lands and lands unavailable for timber production as they could to designate areas managed primarily for spotted owl habitat. Those areas alone were not sufficient to ensure the viability of the owl because they do not have enough of the kind of habitat needed by spotted owls.

## Management of Other Resources

**Introduction** - This environmental impact statement is narrowly focused on a management plan to ensure the viability of the northern spotted owl. Many reviewers who commented on the DEIS wanted the scope of this document broadened to consider the management of other forest resources. The FEIS continues with the same scope, proposed action, and purpose and need that were in the DEIS.

This does not close the door on future consideration of the management for issues for old-growth, old-growth associated species, water quality, or fish stock viability. The land and resource management planning process set up by NFMA assures that such issues will be reconsidered at specified, periodic intervals, as well as when conditions indicate they should be examined or reexamined.

- **Comment:** There should be additional standards and guidelines for the maintenance of water quality.

**Response:** The section "Mitigation and Resource Management Direction" at the beginning of Chapter 2 explains that the management direction in the Forest Plans (or other land and resource management direction) will continue to be in effect after the adoption of any one of the alternatives. Thus, Forest Plans (or other land and resource management direction) provide direction for the management of all resources except for the management of spotted owl habitat.

- **Comment:** Existing best management practices (BMPs) are not monitored for effectiveness in protecting water quality and aquatic habitats; the Forest Service should commit to monitoring water quality BMPs in northern spotted owl habitat areas.

**Response:** While the Forest Service has no reason to not endorse this proposal, the infrequency of ground disturbing activities in designated areas managed primarily for

spotted owl habitat would provide little opportunity for the use of project BMPs and the monitoring of their effectiveness.

- **Comment:** A number of respondents expressed concerns over the management of watersheds for water quality and the effect of management activity on fish stocks; the observations of the Scientific Panel (Johnson et al. 1991) and the alternatives considered by that panel were frequently cited. Respondents requested either alternatives that would address those issues, more in-depth analysis of environmental effects, or both.

**Response:** This environmental impact statement is focused on spotted owl habitat and ensuring its viability. The "Mitigation and Resource Management Direction" section in Chapter 2 indicates that Forest Plans and other land and resource management direction provide for the management of other resources. The disclosure of environmental effects on these resources is appropriate to the nature and level of impacts they will receive from the alternatives, one of which continues, and the others reduce, the level of adverse effect on watersheds.

- **Comment:** Because the northern spotted owl is a management indicator species for other old growth forest associated species, the "fundamental goal" of this environmental impact statement must assure the viability of those other species as well.

**Response:** Those alternatives which result in a high probability of the viability of the northern spotted owl also provide protection for other species associated with old-growth forests. Those consequences are disclosed in the environmental impact statement. However, as noted in several places in this environmental impact statement (Chapter 1. "The Proposed Action"; Chapter 2, "Alternatives Eliminated from Detailed Study"), the management of old-growth forests as distinct from old-growth habitat is outside the purpose and need of the proposed action.

- **Comment:** The Court's opinion of March 7, 1991, (*SAS v Evans*, slip op. 12) noted, "The duty to maintain viable populations of existing vertebrate species requires planning for the entire biological community – not for one species alone." Therefore, alternatives must assure the viability of other species.

**Response:** In the Court's opinion of May 23, 1991, (*SAS v Evans*, slip op. Findings of Fact 20. and 21., the Court, in establishing the schedule for this environmental impact statement, observed:

20. The Forest Service now has advantages it lacked in early 1990. Much of the research and analysis has been done. The ISC Report, a thorough treatment, has been in existence for more than a year. The agency also has the benefit of an opinion letter from the FWS dated April 10, 1991, commenting at length on the ISC strategy and giving recommendations.
21. With the knowledge at hand, there is no reason for the Forest Service to fail to develop quickly a plan to ensure the viability of the spotted owl in the national forests. Coordination with the FWS need not be an obstacle; the agencies have coordinated their efforts on other species, and can on this one.

The Forest Service sees no instruction in Court's orders to prepare a plan for the management of old-growth forests. It sees its definition of the Proposed Action and the Purpose and Need statements in Chapter 1 as being fully responsive to the Court's instructions of May 23, 1991:

A. The Forest Service is enjoined to proceed diligently in compliance with NFMA, as required by the order on April 1, 1991 (Dkt. #867), and to submit to the court and have in effect by March 5, 1992, revised standards and guidelines to ensure the northern spotted owl's viability, together with an environmental impact statement, as required by NFMA and its implementing regulations.

- **Comment:** The Scientific Panel's (Johnson et al. 1991) evaluation of its Alternative 4 (roughly comparable to this document's Alternative B) concluded that viability of the northern spotted owl will not ensure viability of other old-growth associated species.

**Response:** The Scientific Panel's estimates are presented in this environmental impact statement; see the Chapter 3&4 section on "Wildlife Species Associated with Late-Successional Forests". The Scientific Panel's Alternative 4 was based on the management of *both* the National Forests and BLM managed lands within the range of the northern spotted owl, using each agency's resource management plans plus the ISC Strategy.

## **Underlying Purpose and Need**

- **Comment:** "The protection of the old-growth forest ecosystem" is the underlying purpose of the plan.

**Response:** The two underlying purposes of the proposed action are presented in Chapter 1. The differing levels of preservation of old-growth forests are consequences of the management direction for the northern spotted owl of the different alternatives.

## **Disclosure of Risk and Uncertainty**

- **Comment:** The DEIS did not disclose risk or uncertainty.

**Response:** The analysis of the viability of the northern spotted owl is a risk analysis. The analysis of the probability of viability (or persistence) is the same analysis that yields the probability of disappearance. The disclosure of a "low probability of viability" is synonymous with a "high risk (or probability) of disappearance".

The viability (or risk analysis) was evaluated using the theoretical approaches and research methods generally accepted in the scientific community (see "Population Viability" in Chapter 3&4). The FEIS (and DEIS) did disclose the risk of the different management plans (alternatives) to the viability of the northern spotted owl.

The DEIS and FEIS did disclose that there is uncertainty about the precision of the estimates of the effects of the alternatives. This was presented in the section "Incomplete and Unavailable Information" at the beginning of Chapter 3&4.



## Appendix L

The ISC Report, which is the basis for Alternatives B, C, and D and is incorporated by reference, includes a 16 page appendix on Viability Risk Assessment (Appendix T of that document).

- **Comment:** The DEIS failed to disclose and address the existence of scientific uncertainty and foreseeable risks regarding the environmental effects of a proposed action (40 CFR 1502.22).

**Response:** The existence of scientific uncertainty was disclosed in the section "Incomplete and Unavailable Information" at the beginning of Chapter 3&4. The foreseeable risks are disclosed throughout Chapter 3&4. The foreseeable risks to the viability of the spotted owl were presented in the viability analysis. The foreseeable risks to other aspects of the environment and the uncertainty surrounding estimates of consequences were addressed in narratives disclosing the environmental consequences (see, for example, the discussions and appendices on Fire and Fuels Management, and Insects and Diseases). Elsewhere, the uncertainty of estimates are clear in the language that describes the effects in conditional or approximate language rather than in absolute terms.

As indicated in the section "Incomplete and Unavailable Information" the interdisciplinary team examined the incomplete and unavailable information to see, in the language of 40 CFR 1502.22(a), "If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among the alternatives."

The team concluded that the missing information was very unlikely to reverse or nullify established relationships, and therefore, not essential to a reasoned choice among the alternatives. (Therefore, the requirements of 40 CFR 1502.22(b) were not applicable, though the elements of that section are present in the environmental impact statement.)

It is important to review the alternatives in light of the factors they incorporate which minimize the risk to spotted owl habitat and subsequently, the spotted owl.

Each alternative moves at a slow pace. For example, with Alternative B, nesting, roosting, and foraging habitat would be reduced under the Forest Plan standards and guidelines by 0.15 percent annually in the first 50 years. The viability outlook at the 50-year mark is one of a very high probability of viability (Thomas et al. 1990: 39). Habitat conditions are projected to improve (Chapter 3&4, "Criterion 1, Potential Change, Alternative B").

Each alternative incorporates a monitoring plan and an adjustment process to change management direction should new information indicate that habitat, or the spotted owl, is jeopardized.

Management activities in Critical Habitat are the subject of consultation with the U.S. Fish and Wildlife Service in all alternatives.

The alternative selected would be reexamined with the release of the Recovery Plan, and the viability analysis would be reconsidered if the assumptions about management on other Federal lands were changed by the action of the Endangered Species Committee.



Thus, information which is yet to be developed or more fully specified about spotted owls and spotted owl habitat is not essential to a choice now among the alternatives. The implications of the alternatives and their differences are clear in this environmental impact statement; additional unavailable information is not essential to a choice among them.

- **Comment:** The ISC Strategy is an untested experiment. (This concern was expressed both by those who believed it was too conservative, providing unnecessary protection for the owl, and by those who saw it as too reckless, needlessly endangering the owl.)

**Response:** The ISC Conservation Strategy is based on theoretical approaches and research methods generally accepted in the scientific community comprised of those with expertise in the northern spotted owl. There are substantial mechanisms to make corrections to management actions should the outcomes vary from those predicted (see "Adjustment Process" and "Implementation" for the alternatives in Chapter 2).

### **Time and Innovative Strategies Needed**

- **Comment:** The Forest Service should take whatever time is necessary to develop and analyze new and innovative strategies.

**Response:** The Forest Service was unable to take additional time because it is under a court order to complete and implement this management plan by March 5, 1992. The alternatives are based on the best information available at this time. The alternatives include a research dimension which will search out and evaluate new methods and strategies, and an adaptive management process to implement them when their beneficial effects are established.

- **Comment:** The Forest Service should approach the Court and request more time in order to analyze more aspects of forest management.

**Response:** The Court's injunction on the harvest of timber from spotted owl nesting, roosting, and foraging habitat would very likely remain in effect until such time as the management plan was in effect. This would unnecessarily impose an economic hardship on industries, communities, and people. The Forest Service believes, and the Court concurred, that substantial knowledge, research, and analysis of the issues exists to complete this environmental impact statement quickly. The search for new methods and strategies for forest management can and will continue after the completion of this environmental impact statement.

- **Comment:** There is a need to develop innovative uses of forests and forest products, and for cooperative economic partnerships among states, the Forest Service, and local communities.

**Response:** These types of program would require design and coordination with different governments, industries, and agencies. The time to do this is outside that allowed for this environmental impact statement. These types of programs are also outside the underlying purpose of this EIS and can not be reasonably explored in this document.

## Interdisciplinary Process

- **Comment:** The DEIS fails to analyze the ISC Strategy from an interdisciplinary approach. Our National Forests should not be managed solely for one species.

**Response:** All of the alternatives were analyzed using an interdisciplinary team and approach to disclose the management and environmental (including social and economic) effects. The analysis and the alternatives are narrowly focused because the proposed action is focused; the analysis of alternatives and the effects were interdisciplinary.

The National Forests are managed for multiple resources; this environmental impact statement would add management direction for the management of spotted owl habitat.

## Critical Habitat

- **Comment:** Citing 36 CFR 219.19(a)(7), a speaker at one of the public hearings asked why the preferred alternative (Alternative B) designated less acreage managed primarily for spotted owl habitat than Alternative C.

**Response:** The FEIS clarifies the management of Critical Habitat under all alternatives. See "Critical Habitat" in Chapter 2.

- **Comment:** The preferred alternative in the FEIS should not rely on Critical Habitat because the U.S. Fish and Wildlife Service's final rule does not specify how it will be managed.

**Response:** Alternative B does not rely on Critical Habitat Units for its analysis of viability. Alternative B was evaluated on the assumption that Critical Habitat outside of HCAs would be subject only to the standards and guidelines for the Forest Matrix (the 50-11-40 rule). However, as indicated at the beginning of Chapter 2, the agency will manage resources in Critical Habitat through consultation with the U.S. Fish and Wildlife Service.

## Wording, Editing, and References

- **Comment:** Substitute words, such as "possible" in place of "probable," throughout the document. Particular analyses should be characterized in a certain way, such as "highly speculative".

**Response:** The language in the FEIS is that felt to be most accurate by the specialists and writers on the interdisciplinary team. The analysis of environmental effects is the prediction of what will happen in the future. Information on forest resources and relationships continues to accrue. The terms used in the environmental impact statement to indicate the degree of certainty or uncertainty are used by specialists who know the information well. The portrayal of the estimated degree of uncertainty will aid the decision maker in making a reasoned choice among the alternatives.

- **Comment:** The Forest Service should edit and update the ISC Report for readability and clarity since it is being incorporated by reference. Technical language must be rendered palatable to the general public.

**Response:** The ISC Report is a technical report, and technical language is necessary for precise communication. The report is generally very accessible to readers, and the accompanying Questions and Answers clarify and expand on specific points.

New information on the spotted owl is included in this document; updating the ISC Report with the same information would be an inefficient use of time and resources for minimal benefits.

The Council on Environmental Quality notes in their “Forty Most Asked Questions Concerning CEQ’s NEPA Regulations” that material incorporated by reference would include “research papers in the general literature, technical background papers or other material that someone with technical training could use to evaluate the analysis or the proposal”

- **Comment:** The schematic maps of the alternatives in the Summary inadequately depict the options of the alternatives.

**Response:** These maps have been reconfigured to show an actual part of a National Forest and its designated areas under the five alternatives.

- **Comment:** The DEIS was very difficult to review because several important citations were incomplete or absent. Since quotations from the ISC Report were excerpts, there is a danger they were taken out of context, and thus, do not present the risk and uncertainty.

**Response:** The excerpts from the ISC Report (the standards and guidelines for Alternatives B, C, and D) were not taken out of context, but were quoted directly from the Standards and Guidelines in Appendix Q of the ISC Report. Material in that appendix that would not be germane to guiding management actions was not copied into this document, though it is readily available in the ISC Report.

## **Diversity of Plant and Animal Communities**

- **Comment:** The focus of the DEIS is too narrow, responding, as it does, to the Dwyer injunction. An additional alternative should be presented that provides “diversity of plant and animal communities” as required in NFMA, and focuses on old-growth forest ecosystems.

**Response:** The Forest Plans as developed in Region-6 and being developed in Region-5 adequately consider and provide for this diversity of plant and animal communities. Since the Forest Plans remain in effect, with additional protection for spotted owl habitat, the diversity of communities is assured. This environmental impact statement does disclose the reduction in habitat for early-successional forest communities.



## Supplement to the DEIS

- **Comment:** The Forest Service should issue a Supplement to the DEIS to provide an opportunity for the public to comment on Alternative E, the Multi-Resource Strategy. The agency should not have issued the FEIS with that alternative included without having first issued a Supplement to the DEIS.

**Response:** The Forest Service chose to include the Multi-Resource Strategy as an alternative in the FEIS in order to disclose information about its effects on the environment and on the viability of the northern spotted owl.

The CEQ's Regulations state at 40 CFR 1502.9(c) that, "Agencies shall prepare supplements of either draft or final environmental impact statements if (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (ii) there are significant new circumstances or information relevant to environmental concerns or bearing on the proposed action or its impacts."

The Forest Service has made no change in its proposed action (Alternative B) that is relevant to environmental concerns, and it does not see the information disclosed in assessing the consequences of Alternative E to be significant new information relevant to environmental concerns and bearing on the proposed action or its impacts.

The CEQ's "Forty Most Asked Questions Concerning CEQ's NEPA Regulations" provides some additional guidance on the necessity of issuing a supplement to the DEIS in this case. Question 29b says if the alternative suggested by the reviewer is a variation of an existing alternative, and is qualitatively within the spectrum of the alternatives discussed in the DEIS, a supplemental DEIS is not needed.

Alternative E (the Multi-Resource Strategy) is similar in many ways to Alternatives B, C, and D presented in the DEIS. They all: a) designate areas managed primarily for spotted owl habitat that provide for multiple pairs of spotted owls, b) provide for special management of habitat between designated areas, c) call for research to determine silvicultural treatments best spotted owl habitat and therefore for the owl, d) set minimal spacing distances between designated areas, e) abandon the SOHA strategy, and f) assume the continuation of Forest Plans (or Forest Plan completion) on the National Forests.

Alternative E (the Multi-Resource Strategy) is clearly within both the qualitative and quantitative spectrum of the four alternatives in the DEIS, falling, in most analyses, between Alternative B and Alternative A in its environmental and management effects.

Outlines for alternatives similar to the Multi-Resource Strategy were received before the DEIS was printed but were eliminated from detailed study because of insufficient time to develop them. However, the DEIS did note: "The interdisciplinary team will consider a proposal of this type for the Final Environmental Impact Statement," (DEIS, page 2-56).

When the Forest Service received the Multi-Resource Strategy with standards and guidelines and a map, it was immediately mailed to parties in the *SAS v. Evans* lawsuit, and was available to any who requested it. It was also subjected to the same type of independent scientific peer review as the ISC Strategy.



Member of the public and reviewing agencies and governments may submit comments on the FEIS to the Responsible Official through the address on the title page of the FEIS. The Record of Decision will not be signed before March 2, 1991.

### **Shelton Cooperative Sustained Yield Unit**

- **Comment:** The Forest Service should reconsider the designation of areas primarily for spotted owl habitat on the National Forest portion of the Shelton Cooperative Sustained Yield Unit because it is counter to the Cooperative Agreement.

**Response:** The Forest Service is obligated to manage the National Forests, including that portion in the Shelton Unit, in accordance with the National Forest Management Act. This is indicated in the Forest Plan for the Olympic National Forest, and supported in the decision on the administrative appeal to the Chief on that issue. The designation does not require a change in the Cooperative Agreement.

### **Habitat Conservation Areas**

- **Comment:** How were the HCAs mapped for the ISC Report.

**Response:** This explanation is presented in the FEIS. See "Northwest Forestry Association Alternatives" in Chapter 2, "Alternatives Eliminated from Detailed Study."

- **Comment:** The alternative maps show HCAs on lands managed by others, including the Nation Park Service. Were acreages off the National Forests used in the analysis of viability and environmental consequences?

**Response:** The HCAs on all ownerships are included on the maps for Alternatives B, C, and D to indicate the location of those HCAs by the Interagency Scientific Committee. The viability and environmental analysis in this environmental impact statement does not include those acres in the calculations. However, the management of other Federal lands in accordance with Section 7(a) of the Endangered Species Act is an assumption for the viability analysis. See "Assumptions" under "Assessing the Alternatives" in Chapter 3&4.

## Alternatives

### Major Additional, or Modified, Alternatives

**Introduction.** During the comment period many people and organizations offered ideas for new, different, or modified alternatives. They included suggestions for changes in the general management of the National Forests, site-specific changes to boundaries of HCAs and standards and guidelines, sub-regional forest management strategies, the reexamination of Forest Plans for all or specific resource management, and suggestions for major policy or legislative changes. Others requested alternatives that, in the DEIS, were considered but eliminated from detailed study.

As noted in Chapter 1, this environmental impact statement is sharply focused on providing management direction that will ensure the viability of the northern spotted owl. Many requests would require more time than the injunction established, or greater authority than the Forest Service has. This environmental impact statement responds to the need for management direction on National Forests throughout the range of the northern spotted owl. Requests to consider site-specific modifications or special sub-regional management strategies are too limited in scope for inclusion in this programmatic environmental impact statement.

Many of the alternatives suggested are ideas that should be explored in other contexts. Some should be raised as Forest Plans are completed, amended, or revised. Others would have to be examined in the research and monitoring of spotted owl populations, habitat, and habitat management. Others can be addressed in the process of making minor adjustments and clarifications as these standards and guidelines are implemented. And some would require the revision of Federal laws.

### Combination of Alternatives

- **Comment:** The interdisciplinary team should develop and analyze an alternative that would combine the areas to which the standards and guidelines for HCAs are applied in Alternatives C and D, or those areas in Alternatives B, C, and D (which would be the same).

**Response:** An alternative combining Alternative C and D's lands managed primarily for spotted owl habitat was not developed and analyzed as it would not be substantially different from the alternatives already presented. The environmental consequences of such an alternative can be easily estimated from the information about Alternatives C and D; no additional information would be generated that would be essential for a choice among the alternatives.

### Alternatives with Changed Standards and Guidelines

- **Comment:** The interdisciplinary team should develop and analyze alternatives that would:
  - utilize a 75-11-60 rule for managing the Forest Matrix in place of the 50-11-40 rule,

- add protected corridors to Alternative C,
- increase the size of some HCAs to result in an alternative between Alternative B and Alternative C,
- allow all timber to grow to an old-growth stage before harvesting (or manage on a 250-year rotation),
- protect all existing old growth,
- implement the Douglas project,
- modify the SOHA proposal to yield an alternative between Alternatives A and B,
- based on new forestry (or New Perspectives),
- stop all timber harvest and permit no silvicultural management of old growth,
- stop all clearcutting, and substitute thinning and selective harvest,
- develop new industries not tied to forests, plus have an aggressive reforestation program,
- utilize more helicopter logging to selectively harvest old-growth stands to mitigate economic and environmental effects,
- consider growing spotted owl habitat rather than just preserving such habitat,
- establish experimental forests, and develop innovative uses of wood products, and
- develop a less-than-5-year management plan for owl habitat in California for use until the Recovery Plan is established.

**Response:** These requests were presented as brief requests, and lacked sufficient detail on which to base an alternative which would manage spotted owl habitat throughout the planning area. Many of these ideas are also addressed in the FEIS in the discussion of specific resources or environmental consequences, or are responded to in greater detail elsewhere in this appendix.

### **Alternatives Outside Forest Service Authority**

- **Comment:** The interdisciplinary team should develop and analyze alternatives that would have a ten-year "cooling-off period" of no timber harvest, change the laws governing the spotted owl and forest management, restrict the export of logs, and have timber companies fund research directed by a committee with members from both sides of the issue.

**Response:** These proposals are outside the authority of the agency as well as outside the scope of this environmental impact statement.

- **Comment:** The Forest Service should develop an alternative that examines an interagency northern spotted owl plan, even though it is not within the jurisdiction of the agency.

**Response:** The alternatives respond to the underlying purpose and need, which is to ensure the viability of the spotted owl on National Forests. (See the comments and responses in "The EIS Process" section of this appendix.) However, the ISC Strategy, the Forest Service portion of which is Alternative B, is an interagency spotted owl plan.

## A Full Range of Alternatives

- **Comment:** The Forest Service has in this environmental impact statement "failed to create, much less consider, a full range of alternatives."

**Response:** It is a common misconception that NEPA requires an agency to consider a wide, or full, range of alternatives. What is required is that the agency explore and evaluate, "all reasonable alternatives" which respond to the "underlying purpose and need" (40 CFR 1502.14(a) and 1502.13). The alternatives presented in Chapter 2 in this environmental impact statement meet these requirements.

## An "Environmental Alternative"

- **Comment:** Why was no "environmental alternative" examined in the FEIS (to balance the "industry alternative") "

**Response:** As it protects all northern spotted owl nesting, roosting, and foraging habitat, and provides for dispersal habitat throughout the rest of the National Forest, the interdisciplinary team believes that Alternative D well represents the management and consequences of an alternative with extensive preservation of spotted owl habitat.

Also, no "environmental alternative" for managing spotted owl habitat with sufficient detail to analyze the environmental effects was received. No indication of an interest in submitting such an alternative was received during scoping so that it could have been addressed in the DEIS, or during the comment period on the DEIS in sufficient time to be considered in the FEIS.

## Modified Alternative D

- **Comment:** The Forest Service should consider an alternative that would modify Alternative D by prohibiting clearcutting in the Forest Matrix, replacing the HCAs and CHUs with a new series of HCAs (based on the Audubon Society's "Forest Ecosystem Reserves" which typically have less than 20 pairs of owls), and prohibit timber harvest in roadless areas, SOHAs, contiguous 1000-acre stands of original forest, and all spotted owl nesting, roosting, and foraging habitat.

**Response:** This proposal for an alternative goes beyond, in many ways, the scope of this environmental impact statement in an attempt to achieve goals beyond the underlying purpose and need. The substitute HCA system (using reserves apparently not designed to ensure spotted owl viability) does not hold the promise for spotted owl viability as does that of the rigorously reviewed HCA system of the ISC Strategy.

This proposal was first received by the Forest Service on December 27, 1991, which did not permit any modification of the proposal to better respond to the proposed action.



## **Sub-Region Management Alternatives**

- **Comment:** A proposal was submitted to modify the silvicultural prescriptions on the Olympic and Mt. Baker-Snoqualmie National Forests to lengthen the rotation ages, increase fire protection, and prune and thin forests to meet spotted owl habitat needs, along with assuring a continued supply of high quality timber.

**Response:** These proposals were not explored because they did not address habitat needs for the spotted owl throughout its range. Since this proposal would involve changes in forest management well beyond the scope of this EIS, they are better examined as these Forest Plans are reviewed for possible amendment or revision and as a silvicultural strategy to be explored in the Adaptive Management aspects of the Alternatives.

Some aspects of the proposal are addressed in the Timber Management sections of the FEIS and this appendix.

- **Comment:** If the "well distributed in the planning area " of the regulation requiring that viability be maintained (36 CFR 219.19) refers to National Forests rather than Regions, an alternative that applied the ISC Strategy standards to the Cascade forests and exempt certain areas, such as the Oregon Coast Range, should be analyzed.

**Response:** "The planning area" is "The area of the National Forest System covered by a regional guide or forest plan. " (36 CFR 219.3). For this proposed action to amend the Regional Guides, "the planning area" consists of those lands in the Regions administered by the Forest Service within the range of the northern spotted owl. Thus, the population must be well distributed in the full collection of the National Forests in its range.

- **Comment:** Since the northern spotted owl is analyzed using five separate physiographic provinces, there should be more unique management direction for each province, especially the Klamath Province in California.

**Response:** The management direction for all the alternatives does reflect differences in the conditions in the physiographic provinces.

## **Separate Alternative for California**

- **Comment:** Up-to-date information about the northern spotted owl in California and elsewhere was not used; the Forest Service should develop a separate analysis and alternative for lands in California.

**Response:** All currently available information from the scientific literature and from the 1991 field season was used in preparing the DEIS and FEIS. The development of a separate EIS, and separate alternative, for California was considered in the DEIS, but those alternatives were eliminated from detailed study (see Chapter 2, "Alternatives Eliminated from Detailed Study"). The interdisciplinary team concluded that, as in the DEIS, it is not necessary to prepare a separate document or alternative for California lands in order to examine alternatives that will ensure the long-term viability of the northern

spotted owl. See also discussions on the northern spotted owl in this appendix and in Chapter 3&4 of the FEIS. (Other comments requesting that standards and guidelines should be different for the National Forests in California are addressed elsewhere in this appendix.)

## Scientific Panel and Ecosystem Approach Alternatives

(See also "Management of Other Resources" in "The EIS Process" section of this appendix.)

- **Comment:** There are important interrelationships of the spotted owl with old-growth (or ancient) forests and other wildlife species (including the marbled murrelet and salmonids). Therefore, the Forest Service should develop and present an alternative that would use "an ecosystem approach" to take all these into consideration.

(An alternate expression of this comment voiced a concern over a "single species" approach to land and resource management. Others noted that the Scientific Panel (Johnson et al. 1991) rated the ISC Strategy as medium to low for sensitive fish species and for old growth, and thus an alternative should be designed to benefit or protect those components of the environment.)

**Response:** The DEIS and the FEIS both display the environmental effects of the alternatives on existing old-growth stands and associated wildlife species, and it was one of the elements used in comparing the alternatives. Developing and presenting an alternative to manage ecosystems or resources not directly tied to management for the northern spotted owl is outside the scope of this environmental impact statement.

- **Comment:** Include or adopt one or an array of alternatives from the report of the Scientific Panel on Late-Successional Forest Ecosystems (Johnson et al. 1991). (Alternatives 12 and 14 from that report were most frequently requested. The Panel's Alternative 8 was also requested.)

**Response:** This type of alternative was considered but eliminated from detailed study in this environmental impact statement. See that section at the end of Chapter 2.

- **Comment:** The Forest Service should cease timber harvest in old-growth forests, establish large permanent land reserves of natural old-growth forests, permanent land reserves for key stream corridors and watersheds between the old-growth reserves, and cease clearcutting in all parts of the National Forests.

**Response:** As noted in responses to comments in the "Management of other Resources" section of "The EIS Process" in this appendix, this alternative goes beyond the scope of this environmental impact statement.

## **Specific Boundary and Unit Change Alternatives**

- **Comment:** Reviewers submitted maps and text, submitted field sighting notes, and named specific drainages, to advocate alternatives with changed boundaries for HCAs and CHUs or to request the deletion or addition of HCAs from the alternatives.

**Response:** Site-specific changes to specific units and unit and area boundaries are too detailed for this environmental impact statement. Such changes more properly should be referred to the Oversight Team which will evaluate and may recommend changes in boundaries and standards and guidelines to the Steering Committee. See the discussion in Chapter 2– “Implementation of Alternatives B, C, or D”.

## **Alternatives for Lands Off the National Forests**

- **Comment:** Reviewers had questions about, and requests for, alternatives managing lands other than the National Forests for spotted owl habitat.

**Response:** See the comments and responses regarding lands other than the National Forests in this appendix under “The EIS Process.”

## **Alternative C Comments**

- **Comment:** Alternative C’s use of the standards and guidelines for Habitat Conservation Areas (HCAs) for the lands in Critical Habitat outside the HCAs severely restricts timber harvest and other development activities. These restrictions were not specified by the U.S. Fish and Wildlife Service in its proposal. The assumption of such restrictions cause Alternative C to display greater negative economic impact than those estimated by the U.S. Fish and Wildlife Service.

**Response:** The Critical Habitat final rule does not specify what management should occur in the Critical Habitat Units outside of the areas designated as HCAs by the ISC Strategy. The interdisciplinary team determined that in order to examine a management strategy for spotted owl habitat that was more protective than that of Alternative B, the more rigorous management prescriptions of HCAs would be applied. (If the Forest Matrix prescription of 50-11-40 were all that applied to the CHU outside the HCAs, Alternative C would then be identical to Alternative B.) Some other economic analyses of the effects of the proposed CHUs have assumed a timber harvest level in the CHUs outside HCAs at some interim level between the two prescribed levels of harvest. However, no management standards and guidelines were given by the U.S. Fish and Wildlife Service to serve as a basis for habitat management or for estimating other environmental effects. The analysis of Alternative B also serves as an estimate of the environmental consequences of managing the CHUs outside HCAs under the 50-11-40 rule alone.

- **Comment:** Alternative C was based on the U.S. Fish and Wildlife Service’s proposal of May 6, 1991, and the alternative should be changed to reflect the substantial subsequent modifications.



**Response:** Alternative C in the FEIS is based on the January 1992 Critical Habitat final rule, as the DEIS indicated would be done.

### The "No-Action" Alternative

- **Comment:** Alternative A should not be identified as the "'o-Action' Alternative" because it was not in place for long (because of Section 318 and litigation) or because it actually would harvest more timber than the other alternatives.

**Response:** The CEQ Regulations (40 CFR 1502.14(d)) require that an alternative of no action be explored and evaluated, and its "Forty Most Asked Questions Concerning CEQ's NEPA Regulations" indicates in Question 3 that in cases such as this, the "no action" alternative is continuing with the present course of action until the action is changed. As noted in this document, Alternative A is the current management direction upon Judge Dwyer's ruling that the September 29, 1990, notice (55 FR 40412, October 3, 1990) was not in compliance with procedural requirements of the NFMA.

- **Comment:** Alternative A should not be based on the Pacific Southwest Regional Guide because it was vacated by the Forest Service.

**Response:** The September 29, 1990, vacating of the 1988 Record of Decision for the Region 6 Supplemental FEIS was found not to be in compliance with the NFMA's procedural requirements. Thus, it remains the part of the management direction used to describe the no action alternative, and would be the relevant management direction should Alternative A be selected.

- **Comment:** Because the Forest Plans are not complete for four of the northern California National Forests, and because the Record of Decision for the Regional Guide was vacated, the Timber Management Plans for those Forests should constitute the No Action Alternative.

**Response:** The Court in *SAS v Evans* ruled that the decision vacating the Record of Decision was not in compliance with the NFMA procedures. Therefore, the Regional Guide direction is the ongoing direction that would apply in the absence of the proposed action.

### "Multi-Resource Strategy" Alternative

- **Comment:** Over two thousand people who submitted written comments and spoke at the hearings asked that the interdisciplinary team present the Multi-Resource Strategy and its effects in the same manner as the other alternatives. They also asked that the Forest Service adopt and implement that strategy.

**Response:** The Multi-Resource Strategy is presented in the FEIS as Alternative E. The Record of Decision, which will follow this FEIS by a month, will identify which alternative (or variation) is adopted.



- **Comment:** Why was the industry alternative (designated as Alternative E in the FEIS) being considered since it was based on economics and not on sound scientific principles? It should not be included because it does not meet the purpose of the proposed action—to ensure the viability of the northern spotted owl.

**Response:** The alternative was included because it: a) was requested by a large number of respondents, b) proposed management prescriptions in sufficient detail that its environmental effects could be evaluated, c) was a management proposal that might have met the purpose and need of the proposed action.

The interdisciplinary team's principal focus was in assessing the environmental and viability effects of the alternative's standards and guidelines in the National Forests. The adequacy of the scientific basis supporting the proposal was not a principal question addressed by the interdisciplinary team, as the interdisciplinary team was expressly concerned with the environmental consequences including the viability of the spotted owl, of managing the National Forests with the management direction proposed. The Strategy has been sent to a number of recognized scientists for an independent peer review in order to obtain a review of its scientific credibility.

The alternative's ability to adequately respond to the purpose of ensuring the viability of the owl could not be determined without analysis.

## **Incomplete Alternatives**

- **Comment:** It appears that the alternatives are incomplete because they lack mitigation measures or management practices that would be implemented.

**Response:** All alternatives retain the management direction of Forest Plans, Regional Guides, or other land and resource management direction. See "Mitigation and Resource Management Direction" at the beginning of Chapter 2 in the FEIS.

## Implementation

### Incorporation of Research

- **Comment:** There is a need to incorporate a mechanism to initiate research into forest management practices to broaden the base of habitat for spotted owls, and to incorporate these into Forest Service management policy.

**Response:** Such a mechanism is part of all the alternatives. See the sections on "Adaptive Management" in the description of each alternative in Chapter 2 of the FEIS.

### Amendment of Standards and Guidelines

- **Comment:** Each of the alternatives includes an "adjustment process" that allows for adjustments to the areas and standards and guidelines to allow for changing conditions and new information. There is no language that assures that these changes would be favorable to the viability of the owl.

**Response:** Chapter 2 of the FEIS presents information on the "Adjustment Process" and on "Implementation". Proposed changes are all evaluated for consistency with the selected strategy, and subject to the NEPA process and administrative appeals, before implementation. The requirement of consistency with the strategy, combined with environmental analysis and involvement and notification of agencies and the public, assure that the changes will be either favorable or neutral in their effects on the viability of the northern spotted owl.

- **Comment:** Standards and guidelines should not be subject to amendment on a site-specific basis for particular timber sales. The adaptive management mechanism should not be used within HCA's.

**Response:** The process of implementing the decision is presented by alternative in Chapter 2 of this document. This EIS describes a process that is an expansion of the process established in the ISC Report, and uses an Oversight Team and a Steering Committee. The implementation and adaptation process will be subject to NEPA, with documentation appropriate to the action.

- **Comment:** Any conflict arising between the selected alternative and existing Forest Plan standards and guidelines should be resolved in favor of non-intervention in natural processes.

**Response:** The section "Implementation" for each of the alternatives (see Chapter 2) indicates that the Forest Plan amendment and NEPA processes will be used to resolve any such conflicts.

## **Area Boundaries**

- **Comment:** The alternative maps accompanying the DEIS were too generalized to accurately designate the location of owl management areas. If boundaries were not specified in the FEIS, additional NEPA documentation would have to accompany future boundary specification.

**Response:** The boundaries of the areas, which are illustrated on the FEIS maps, are in the GIS system in detail (see Appendix B) and represent boundaries located in operational detail for all alternatives.

## **Technical Review Team**

- **Comment:** Questions were raised regarding the "interagency technical body organized to review implementation of the conservation strategy", especially if the Forest Service is the only agency formally implementing the ISC Strategy.

**Response:** The interagency Technical Review Team was organized in November 1990. (See Chapter 2 of the FEIS.)

- **Comment:** The results of the Technical Review Team must be open to full public review and appeal.

**Response:** The adjustment process and implementation of the alternatives described in Chapter 2 of the FEIS make full use of the NEPA process and have access to administrative appeals of decisions.

## **Standards and Guidelines for Activities**

Several asked specific questions concerning which activities are consistent with the management direction of the alternative. Information on management under Alternative A will be found in the Forest Plans and Regional Guides. Specific direction and interpretation for Alternatives B, C, and D will be found in three question and answer documents that were incorporated by reference (USDA Forest Service, 1991a, Thomas 1991, and Mays and Mulder 1991b.) They are available from the address on the title page.

- **Comment:** A reviewer asked for additional information on FERC (Federal Energy Regulatory Commission) applications in HCAs, and requested additional information about the standards and guidelines that would apply.

**Response:** Question 6 of the second set of questions and answers (Thomas 1991) notes: "Such activities as small hydroelectric projects, . . . may or may not significantly affect the quality of owl habitat. These should be considered on a local basis using local knowledge to assess the effects of the proposals."

## Appendix L

Information regarding the current status of applications can be best obtained from the appropriate Regional, Forest, or Ranger District Office. Some of these may be referred to the Oversight Team for evaluation of their consistency with the selected alternative.

- **Comment:** Explain which non-timber activities are allowed in HCAs.

**Response:** Most activities that do not adversely impact spotted owl habitat are permitted. These include greenery, fern, and mushroom gathering, berry picking, and cone harvesting. Activities such as small hydroelectric projects, campground and trail construction, ski resorts, and rock pit expansions may or may not adversely affect spotted owl habitat, and must be evaluated on a case-by-case basis (Thomas 1991, Question 6). Activities specifically prohibited are identified in the standards and guidelines for Alternatives B, C, and D in the FEIS. Activities not specifically addressed will be evaluated by the Oversight Team for their consistency with the selected alternative.

- **Comment:** Under the 50-11-40 Rule the area within the National Parks would be used to calculate the 50 percent of the quarter township's forest landscape in forest stands with a mean d.b.h. of 11 inches and 40 percent canopy closure. Could application of this rule lead to clearcutting up to National Park boundaries?

**Response:** It could, if the standards and guidelines for the management areas adjoining National Parks in the Forest Plans permit it, and the environmental analysis for the proposed harvest shows it to be the optimum harvest method.

## Implementation in California

- **Comment:** How would the decision be implemented in California, where several National Forests do not yet have approved Forest Plans?

**Response:** The process by which this decision will be implemented for each of the alternatives in northern California is described in the "Implementation" section for each alternative.



## The Northern Spotted Owl

### Scientific Credibility of the ISC Report

- **Comment:** The ISC Report is not scientifically credible since it is a product of subjective personal judgement rather than objective scientific research.

**Response:** The ISC Strategy for the northern spotted owl is scientifically credible for several reasons. First, the scientific method was used to develop the strategy. Strategies were tested and adjusted with the best available quantitative data and other information including modeling. Second, each member of the committee had credentials, experience, and reputations appropriate to the task. Third, published literature, reports and ongoing research was reviewed and considered when developing the strategy. Finally, the report was subject to thorough peer review by professionals selected by the following societies: The Wildlife Society, Society of American Foresters, Society for Conservation Biology, The American Ornithologists' Union, and The Ecological Society of America (USDA Forest Service 1991a, Question #15).

- **Comment:** The Forest Service should not accept the ISC Report because it is being rejected by other sources. The report entitled the "Facade of Science" and criticisms received in *SAS v Evans* were given as specific examples.

**Response:** The Forest Service accepts the ISC Strategy because it is a scientifically credible strategy for the conservation of the northern spotted owl. The "Facade of Science" is the most commonly referenced document that criticizes the ISC Strategy as not being objective science. The "Facade of Science" states, "This does not mean that the ISC Strategy is necessarily wrong or is fatally flawed". The "Facade of Science" is founded on selective quotations taken out of context from depositions given by five members of the Interagency Scientific Committee. In addition, the "Facade of Science" did not identify the authors so their credentials are not known.

In the court transcripts for *SAS v Evans*, Doaks, Orians, and Kareiva critique the ISC Strategy, particularly the modeling. Modeling was only a part of the ISC Strategy. The ISC utilized the best available information and professional judgement in the development of the ISC Strategy. It is the most scientifically credible plan for management of the northern spotted owl developed to date.

- **Comment:** There is little chance that the coordinated interagency effort necessary to fully implement the ISC Strategy, in either the short or long term, will materialize. Explain how this will work.

**Response:** A detailed description of the interagency coordination required to successfully accomplish all aspects of the strategy is described in this environmental impact statement in Chapter 2. However, the full implementation of the ISC Strategy by all agencies is not necessarily required. In fact, the viability analysis in this EIS assumed other agencies would comply with the Endangered Species Act.

- **Comment:** Some of the assumptions used in the ISC Strategy were too optimistic.

**Response:** The Interagency scientific Committee interpreted the data with recognition to uncertainties and assumptions. Assumptions must be made with any modeling effort. The best available empirical data was reviewed by the committee and uncertainties pertaining to the models were clearly identified in Appendix M of the ISC Report (Thomas et al. 1990). The viability ratings; HIGH, MEDIUM and LOW, account for degrees of uncertainty.

Further, while quantitative analytical methods were used in the ISC Report, and in this EIS, these were not the only methods used to assess population viability. Professional judgement was relied upon after review of the best available empirical data. Therefore, any potential problems with the modeling effort is expected to be minimal.

Monitoring, research and the Spotted Owl Recovery Plan, which is expected to be released this year, will provide information to test these assumptions thereby providing information necessary for adaptive management. Additional precautions will be provided by the project level consultation with U.S. Fish and Wildlife Service on actions that affect spotted owls and their habitat.

- **Comment:** The fact that some information used in the ISC Report was incomplete and other information was unavailable raises questions regarding the conclusion that the "central relationships are well established" as well as the conclusion that the incomplete and unavailable information is "not essential to a reasoned choice among alternatives."

**Response:** The information used for this environmental impact statement analysis was the best available. The scientists and biologists who developed and reviewed the viability analysis in this EIS are experts in their fields. The basic information upon which the ISC Strategy was founded was from recent and pertinent research, and after review of new information it was determined that central relationships such as population trends and structural characteristics of preferred habitats have not changed significantly since publication of the ISC.

Incomplete or unavailable information on factors that could influence population size may change in value as new research and monitoring information is gathered.

Since publication of the ISC Strategy, additional owl locations have been identified. As a result, the number of spotted owls reported in this document is larger than that reported by the ISC. This increase does not materially change results of the analysis in this EIS, which is based on habitat capability rather than numbers of known owls.

## Endangered Species Act and Consultation

- **Comment:** Because the northern spotted owl is listed as a Threatened species under the Endangered Species Act, you must be sure you complete consultation requirements with U.S. Fish and Wildlife Service. Explain the U.S. Fish and Wildlife Service's role for consultation on this effort and on the alternatives analyzed.

**Response:** The Forest Service requested that the U.S. Fish and Wildlife Service provide a biological opinion on the preferred alternative, Alternative B, to assure that it complies with the Endangered Species Act. On December 18, 1991, the U.S. Fish and Wildlife Service completed formal consultation on the preferred alternative and concluded, "It is the biological opinion of the Service that adoption of the preferred alternative B, the Interagency Scientific Committee's *A Conservation Strategy for the Northern Spotted Owl* (Conservation Strategy) [Thomas et al. 1990], is not likely to jeopardize the continued existence of the northern spotted owl".

The U.S. Fish and Wildlife Service can give "conservation recommendations" that are suggestions regarding discretionary measures to minimize or avoid adverse effects of the proposed action on any listed species or Critical Habitat. If the U.S. Fish and Wildlife Service feels the proposed action needs to be modified, they provide mandatory "terms and conditions" that must be followed to assure compliance with the Endangered Species Act.

The U.S. Fish and Wildlife Service included six conservation recommendations in their biological opinion. No mandatory terms and conditions were included. For additional information, a copy of the Biological Opinion is included in Appendix M of this document.

- **Comment:** Since the Endangered Species Act prohibits Federal agencies from "taking" any listed species, explain how the Forest Service is in compliance with the Endangered Species Act by allowing for a loss of spotted owls.

**Response:** "Taking" of a listed species may be allowed, but the U.S. Fish and Wildlife Service must permit such action. Through consultation with the U.S. Fish and Wildlife Service the Forest Service may be allowed to "take" a listed species.

- **Comment:** One issue that needs to be addressed is the affect that noisy activities have on owls.

**Response:** Neither the ISC Report nor this environmental impact statement state activity restrictions for noisy activities. The U.S. Fish and Wildlife Service, through consultation on project proposals, recommends activity restrictions when necessary.

## Range of the Northern Spotted Owl

- **Comment:** You should reconsider the eastern boundary of the range of the northern spotted owl in California.

**Response:** The range of the spotted owl is displayed near the beginning of Chapter 3&4 of this document. This map reflects the boundary as determined by the Interagency Technical Review Team for the Northern Spotted Owl in June 1991. This boundary may be adjusted in the future as warranted by new information.

- **Comment:** The Forest Service is wrong when it assumes the Pacific Northwest was historically the range of the northern spotted owl.



## Appendix L

**Response:** Available research and historic accounts of spotted owl distribution indicates that western Washington and Oregon, and northwest California were part of the range of the northern spotted owl.

- **Comment:** You should consider coordinating with Canada regarding the management of the northern spotted owl.

**Response:** This environmental impact statement deals with the northern spotted owl on National Forests in the United States. Cooperative efforts and coordination for the benefit of the subspecies between governments is not prohibited because of this EIS. However, such coordination is outside the scope of this EIS. Other species benefit from cooperative efforts between the United States and Canada, the northern spotted owl may be included in the future.

## Incorporation of Current Literature, Studies, and Surveys: Habitat

- **Comment:** If the information about owl habitat has changed since the ISC Report was published, explain how it has changed and how you have incorporated the changes.

**Response:** The preparation of this EIS included a review of relevant scientific studies that have been published or are still in progress since the ISC published its Conservation Strategy. Appendix D, Annotated Bibliography, provides a summary of published and unpublished reports reviewed. No conclusions on spotted owl biology or habitat needs were changed from the ISC Report after reviewing this literature.

New information from ongoing studies in northern California and the east side of the Washington and Oregon Cascades might help clarify habitat use and characteristics in these provinces after these studies are completed, analyzed and peer reviewed.

In addition, northern spotted owl habitat acres were updated in this document to represent the most recent information from each National Forest.

- **Comment:** All the studies used to establish habitat definitions and/or demographic values were from areas of multiple use management and none were from areas of old-growth forests.

**Response:** The studies used to establish habitat definitions and/or demographic values to determine spotted owl population status and trends were generated from a variety of areas (Wilderness, National Parks, full timber yield, etc.), many of which had significant areas of old-growth forest.

- **Comment:** The ISC Report described areas of concern that should be reevaluated due to the increase in known owl pairs.

**Response:** Information on areas of concern was compiled from a variety of sources and is described in Chapter 3&4 of the FEIS. Areas of concern were delineated for a variety of reasons, not just the number of owl pairs. Isolation of the province, habitat



fragmentation, amount of nesting, roosting, and foraging habitat, amount of public land and owl population density were all factors that influenced whether an area was considered an area of concern.

## **Incorporation of Current Literature, Studies, and Surveys: Spotted Owl Biology**

- **Comment:** You should develop and select another alternative because of the discovery of more and more spotted owls.

**Response:** This EIS focuses on measures necessary to protect and manage northern spotted owl habitat. It recognizes that, because not all areas have been surveyed, more spotted owls exist than are currently known and that more spotted owls will likely be found in the future. The location and number of spotted owls found to date does not conflict with the assumptions used in this environmental impact statement or in the ISC Strategy.

- **Comment:** All private and State lands in California have 830 pairs of spotted owls according to the DEIS Chapter 3&4. There are more than that on one private industry/timber company's lands alone. We do not understand why the numbers are so low.

**Response:** The interdisciplinary team used the most recent information available on spotted owl numbers that represented results of surveys during the past five years, or historic totals as reported by a variety of sources (BLM, FS, NPS, Tribal agencies, and State wildlife agencies).

- **Comment:** The Forest Service should incorporate the most recent northern spotted owl survey data which shows that current spotted owl populations exceed the level the ISC Report mandates for recovery.

**Response:** The most recent owl data were used in this EIS. The ISC Report did not mandate any level of spotted owl populations for their conservation strategy. Both the ISC Report and the analysis in this environmental impact statement predict that more spotted owls will be found with increases in survey efforts, which does not conflict with assumptions made about potential owl populations in either document. Neither the ISC Report nor this EIS is a northern spotted owl recovery plan.

## **Nesting, Roosting, and Foraging Habitat**

- **Comment:** You should explain your definition of northern spotted owl habitat.

**Response:** This environmental impact statement uses two categories of habitat: one for dispersal, and one for nesting, roosting, and foraging. Both of these categories are discussed in Chapter 3&4 of this EIS.

## Appendix L

- **Comment:** Explain how much owl habitat remains today when compared to original (historic) levels.

**Response:** The trend in northern spotted owl habitat from historic levels to present is estimated and presented in Chapter 3&4.

- **Comment:** It is not clear why some areas in designated areas managed primarily for spotted owl habitat are essential for spotted owls when those areas are not northern spotted owl habitat today.

**Response:** Many acres that are in designated areas managed primarily for spotted owl habitat are not nesting, roosting, or foraging habitat today. The standards and guidelines are designed to identify areas important to the spotted owl and to allow immature forest stands to mature and develop into spotted owl habitat in the future. This for the long-term creation of large blocks of contiguous habitat. These large blocks are more likely to support spotted owls than smaller, discontinuous blocks.

- **Comment:** Explain how the amount of northern spotted owl habitat was estimated at 100 years and 150 years without a timber harvest plan.

**Response:** Habitat within designated areas managed primarily for spotted owl habitat and within reserved areas would not be scheduled for timber harvest. The interdisciplinary team assumed the majority of land capable of growing trees would grow into spotted owl habitat using a specific growth curve based on local conditions for each National Forest. Future habitat outside of designated and reserved areas were estimated using analytic models as described in Appendix B.

- **Comment:** The DEIS projects owl habitat recruitment through time but fails to explain or justify the predicted recruitment rates.

**Response:** Explanation of the recruitment rates are found in the FEIS in Chapter 3&4 Viability Assessment and Assumptions, and in Appendix B.

- **Comment:** Large fires could wipe out significant acreages of spotted owl habitat and this should be considered under the preferred alternative.

**Response:** The possibility of large fires altering significant acreage of habitat was considered when developing the alternatives. The potential catastrophic loss of habitat due to fire or other events is one reason why large areas that provide for clusters of spotted owl pairs were recommended. A network of designated areas managed primarily for spotted owl habitat provides insurance against catastrophic losses of habitat, and hence is needed to ensure viability over the long term across the range of the spotted owl.

- **Comment:** You need to consider that northern spotted owl habitat varies across its range. Owl habitat in one province may look quite different than owl habitat in

another. The differences in habitat will translate into different responses when habitat is manipulated and the provincial differences may govern the amount and types of activities considered in HCAs.

**Response:** The interdisciplinary team considered the variation in spotted owl habitat and home range size between physiographic provinces. Local knowledge and experience with spotted owl habitat was relied upon for the delineation of northern spotted owl nesting, roosting, and foraging habitat in each National Forest. The EIS does not recommend any habitat manipulation activities in HCAs.

- **Comment:** The assumption in the ISC Report that spotted owl nesting, roosting, and foraging habitat is declining precipitously is not true.

**Response:** The interdisciplinary team for this environmental impact statement found that nesting, roosting, and foraging habitat has decreased and is continuing to decrease from historic levels. These decreases are documented and discussed in Chapter 3&4 of this document.

- **Comment:** The map of Alternative D does not show the actual nesting, roosting, and foraging habitat for the northern spotted owl. Your display map should delineate each stand of nesting, roosting and foraging habitat protected in Alternative D. The public and the decision maker need to know exactly what is being proposed.

**Response:** The scale used in the maps accompanying this environmental impact statement is not suited to displaying individual stands of nesting, roosting, and foraging habitat for Alternative D. The maps in this EIS show only the general distribution of habitat. However, the analysis and data tables in this EIS are based on more detailed maps. These maps are available to the decision maker for review.

## **Owls in Managed Forests**

- **Comment:** Since recent information indicates that there are many more northern spotted owls in fragmented forests than originally thought, fragmented forest must be suitable habitat. Later studies indicate that spotted owls thrive in fragmented and second-growth forests.

**Response:** The basic conclusion that northern spotted owls prefer habitats with structural characteristics usually found in older forest has not changed and has been consistently supported by research since the mid-1970's. As survey intensity has increased over the last several years more northern spotted owls have been found in fragmented and second-growth forests. There are no studies that support the assumption that spotted owls thrive in fragmented forests, "thrive" being equated with long-term pair existence with high offspring survival. Forests that are inhabited by spotted owls have varying degrees of fragmentation. Research has shown that as owl habitat within home ranges decreases, home range size of spotted owls increases. Usually, as habitat decreases it is accompanied by an increase in fragmentation.

It is believed that dispersing spotted owls will use younger forests. However, where reproductive pairs have been found in second-growth forests, remnant patches of older forest or younger stands that have developed older forest characteristics also occur. Often the nest sites are in older trees.

- **Comment:** Your alternatives ignore two years worth of scientifically credible research about northern spotted owls in second-growth forests.

**Response:** Ongoing studies might help clarify spotted owl habitat use and characteristics in second-growth forests. Most second-growth forests used by spotted owls appear to contain structural characteristics of older forests. Both the ISC Report and this EIS acknowledged these studies. Most of the information is still in the form of unpublished reports that have not been peer reviewed. Peer review is an essential step in the process that determines scientific credibility of methods and analyses.

Much of the information on spotted owl habitat use that has recently surfaced is based on increased survey efforts in a wider variety of habitats than previously inventoried. Although spotted owls may occur in relatively young forests (80 years old), the reproductive success over the long term in such forests has not yet been established. The known number of reproductive owls in young forests is a small percentage of the number known to nest successfully in mature and old-growth forests. Understanding the specific attributes of forests that may support successful reproduction is a research priority. As the result of research accumulate, definitions of habitat use by spotted owls will likely change.

## Habitat on State and Private Lands

- **Comment:** Much of the checkerboard ownership in HCAs should be consolidated to better manage habitat for the spotted owl.

**Response:** The standards and guidelines for the ISC Strategy identify a need for the consolidation and acquisition of land within HCAs to better manage northern spotted owl nesting, roosting, and foraging habitat.

- **Comment:** You should explain why you didn't account for the spotted owl habitat provided on private timberland.

**Response:** We do assume that some nesting, roosting, foraging and dispersal habitat will come from private lands because of the protection measures afforded species listed as either Threatened or Endangered under the Endangered Species Act.

- **Comment:** The U.S. Fish and Wildlife Service says the Sierra Pacific Owl Management Plan for northern California is implementable and provides protection for both spotted owl habitat and the timber economy. Explain why the Forest Service isn't using a plan like this.



**Response:** In this situation the U.S. Fish and Wildlife Service approved levels of habitat protection as identified in the Sierra Pacific Management Plan to avoid a “take” action. This was helpful to guide timber harvesting in areas inhabited by owls because this plan directed the protection of individual owls over the short term. The results of such efforts fail to meet the purpose and need for this environmental impact statement, that is, to develop an alternative to ensure the long-term viability of the northern spotted owl across its range. So although site-specific protection for the short-term prevents individual owls from being lost, it does not protect nesting, roosting, and foraging habitat over the long-term, and over areas large enough to allow spotted owl populations the opportunity to recover.

## Known Number of Northern Spotted Owls

- **Comment:** The Forest Service has erred in accepting the theory that the number of northern spotted owls in the Pacific Northwest was on the decline when all baseline data indicates otherwise.

**Response:** Recent surveys have identified additional spotted owls due to an increase in survey efforts. There is no information that indicates the population size of northern spotted owls has increased. This is based on two lines of evidence. First, acreage of nesting, roosting, and foraging habitat has decreased when compared to historic levels. Second, analyses of data from five northern spotted owl demographic study areas in Washington, Oregon and northern California indicate that spotted owl populations are declining in all five areas. These studies are designed to show changes in owl numbers through application of rigorous scientific procedures.

## Subspecies Status

- **Comment:** The Forest Service has erred in treating the northern spotted owl as a subspecies when it is, in fact, no different than any other spotted owl in America.

**Response:** The American Ornithologists' Union recognizes 3 subspecies of spotted owls in North America. This document deals with the northern spotted owl because it is listed by the U.S. Fish and Wildlife Service as Threatened and the planning regulations of NFMA (36 CFR 219.19) direct that “Fish and wildlife shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area”. In this context, the California and the Mexican spotted owl subspecies are not considered as part of the spotted owl population in the area covered by this analysis.

## Spotted Owl Biology

- **Comment:** Historic levels of habitat and spotted owls are largely unknown, so owls may have experienced large fluctuations and always recovered.

**Response:** The chance of large losses of habitat due to natural events is always present and is discussed in Chapter 3&4. However, large areas that held reserves of spotted owls in the past and served as reservoirs of owls to recolonize impacted areas are not present

today due to human activities and habitat manipulation. Consequently, designated areas managed primarily for spotted owl habitat will serve not only as long-term spotted owl reproductive centers but as reservoirs of spotted owls for designated areas that might go through natural habitat fluctuations.

- **Comment:** New studies show spotted owls are reproducing in Wilderness and National Parks and you should use those habitats in your analysis.

**Response:** Acres of spotted owl habitat in Wilderness on National Forests are incorporated in all analyses in this EIS.

- **Comment:** Explain how you can harm a bird like the spotted owl when it appears to be so tame.

**Response:** The "tameness" of an organism is not a measure of its ability to tolerate changes to its habitat. Wildlife species that tolerate human presence are not tame, in the sense of animals domesticated by humans for centuries. Spotted owl habitat has steadily declined over the past three to five decades. The concern for spotted owls is the loss of nesting, roosting, and foraging habitat, accompanied by an additional loss of habitat effectiveness due to fragmentation. The loss of forest structural characteristics and habitat complexity is also a concern as they relate to nest tree abundance and prey availability and vulnerability.

- **Comment:** Explain how logging causes a decline in spotted owl populations.

**Response:** The EIS provides an explanation of how logging causes a decline in spotted owl habitat and population viability. Animal populations cannot persist without sufficient amounts of habitat capable of supporting their life cycle needs. Loss of nesting, roosting, foraging and dispersal habitat due to logging results, sooner or later, in the reduction or loss of individual northern spotted owls. There are many examples of this occurring with other species, such as the grizzly bear and red-cockaded woodpecker. The decline is discussed in Chapter 3&4.

## Artificial Protection Measures

- **Comment:** We should be expanding populations of endangered species by artificial means through the transfer of owls, artificial propagation and habitat development.

**Response:** Artificial propagation and artificial habitat development are available options. However this type of intensive hands-on management is usually used as a last resort to save a species from extinction. Such measures are viewed as high risk because of the amount and frequency that individuals of the species would have to be handled. Without adequate amounts of quality habitat available to transfer northern spotted owls into, success of introduction and reintroduction programs is limited. Another concern is the lack of available owls for such action. If habitat is not available in sufficient amount and distribution then spotted owl populations are expected to be low in all areas and thus

there will not be surplus owls for transfers. The risk to the species, balanced with the low likelihood of success does not result in a high priority for action.

Protecting habitat and populations in the wild is the first step to recovering a species from threatened or endangered status. Silvicultural manipulations of habitat have not been demonstrated to be beneficial to northern spotted owls. However, if silvicultural manipulations are conclusively demonstrated to enhance or provide spotted owl habitat then this type of management could be incorporated through the adaptive management process.

## **Adequacy of Viability Analysis**

- **Comment:** You should select Alternative A because SOHAs can maintain owl viability.

**Response:** Based on spotted owl viability analysis in this document, Alternative A, which reflects current Forest Plan and Regional Guide direction, would result in a LOW likelihood of viability for northern spotted owls and thus would not ensure viable populations. The definition of low viability and the reasons why Alternative A was rated LOW in this analysis are discussed in the viability sections of Chapter 3&4.

- **Comment:** You should select Alternative A because Alternative A is not too great a risk for owl viability since Forest Plans must be revised every ten years and Alternative A is closest to Forest Plans. There is not an urgent need to alter existing harvest practices.

**Response:** The results of the viability assessment disclose the effects of Alternative A. Alternative A did not meet the purpose and need of this environmental impact statement, to provide adequate protection over the planning area to ensure the long-term viability of the owl; it rated as having a LOW likelihood of maintaining viable populations of spotted owls. The urgency to alter existing timber management practices is based on the loss of northern spotted owl habitat which was also an important consideration in the process that ultimately caused the listing of the northern spotted owl as a Threatened subspecies. The fact that a document is scheduled for revision after 10 years does not equate to eliminating risk to viability due to an alternative that cannot provide for the long term.

- **Comment:** The rate of harvest of nesting, roosting, and foraging habitat outside HCAs exceeds regrowth of habitat in all areas. The loss may decrease habitat below the viability threshold.

**Response:** The provision for large designated areas to be within close proximity to each other throughout the range of the owl, coupled with the other provisions in the ISC Strategy, are more important for spotted owls than the absolute amount of habitat. A decline in spotted owl habitat was recognized by the Interagency Scientific Committee and is documented in this EIS. The decline in northern spotted owl nesting, roosting, and foraging habitat due to timber harvest is included in the calculations of potential change in owl habitat over time in the viability analysis, criterion 1. Although the amount of habitat will be less in the short term over all areas and permanently less in the Forest Matrix, both the ISC Report and the analysis in this EIS rate the viability of the northern spotted



owl as HIGH in the long term in Alternatives B, C, and D. This HIGH rating is, in part, because the regrowth of habitat will exceed harvest rates under these alternatives.

- **Comment:** Explain how a drastic decline in the current owl population (estimated to be as much as 50 percent in the ISC Report) can leave us with a reasonable chance of maintaining a viable population of northern spotted owls.

**Response:** Under any alternative spotted owl numbers will decline in the short term. The ISC Report views the above referenced 50 percent decline as a worst-case scenario that assumes no owls will occur in the Forest Matrix between HCAs. This EIS accounts for owls in the Forest Matrix. An assumption of the ISC Strategy is that the overall number of spotted owl pairs is less important than the distribution of pairs (size of spotted owl clusters and distances between them). The ISC Strategy (Alternative B) results in a reduced population when compared to present levels, but a much more secure population due to size, spacing, and security of habitat. The habitat capability calculations in this EIS estimate a 26 percent decline from current habitat capability levels under Alternative B. The arrangement of habitat in large blocks that are adequately spaced compensates for a smaller population.

- **Comment:** Although the HCAs contain many pairs of northern spotted owls today, the ISC Report does not present any analysis to show that the HCAs are currently functioning as clusters of owls. Explain why you think they are or do not need to be at present.

**Response:** In the viability analysis, owls were assumed to be currently interacting with other owls within and outside of the HCAs. Therefore, the viability analysis assumes that, since all spotted owls are interacting, HCAs are not functioning as discrete clusters at the present time. In the future, as habitat in HCAs increases and habitat in the Forest Matrix decreases, they will begin to function as discrete clusters.

- **Comment:** HCAs can be smaller and still support viable populations of breeding pairs of spotted owls.

**Response:** The size of HCAs is based on the need to provide a block of habitat that can support a cluster of at least 20 pairs of spotted owls. Smaller HCAs might be able to sustain a cluster of spotted owls over the short term. However, if the size of the clusters decreases, then the likelihood of persistence over the long term decreases. The viability analysis for this environmental impact statement used actual maps and spatial analyses to determine the habitat capability in designated areas managed primarily for spotted owl habitat.

## Minimum Viability

- **Comment:** Because the thresholds controlling viability and extinction are essentially uncertain, this EIS should identify the minimum number of reproductive individuals required to maintain viability as well as the minimum amount of habitat which must be provided for these individuals by National Forest.



**Response:** The absolute value which assures viability or precipitates extinction is unknown. It is not simply an absolute number of owls that could assure viability, the amount and pattern of habitat are primary factors in providing for a viable population.

Research and monitoring of northern spotted owl populations will provide opportunities to evaluate management, and alter the current direction if needed. Management direction is conservative enough to allow detection of any adverse effects to spotted owls in sufficient time to use the adjustment process to preserve long-term viability.

- **Comment:** Concern was raised that spotted owls will not survive the transition from today's distribution of nesting, roosting, and foraging habitat to the ISC Strategy's projected future landscape.

**Response:** The ISC Strategy was given an overall viability rating of HIGH in both the ISC Report and this EIS with recognition that habitat will decrease in the short term. The ISC Strategy was rated as providing a VERY HIGH probability of sustaining spotted owl populations for at least 50 years (Thomas et al. 1990: 39). The ISC Strategy provides for a pattern and distribution of habitat to minimize risk to the spotted owl.

The standards and guidelines of the ISC Strategy, such as those for designated areas and dispersal habitat, are designed to provide for a viable population of northern spotted owls. An example of how the ISC Strategy accounts for particular areas is that in areas of concern, Category 1 or 2 HCAs are delineated, and in some areas, Category 3 HCAs are required. The EIS viability analysis for this environmental impact statement recognized that there is an expected loss of habitat at year 50, but after review of the entire Strategy, Alternative B was given an overall viability rating of HIGH.

## Viability Rating

- **Comment:** Please clarify whether the viability ratings in the DEIS were made by the panel of spotted owl scientists and experts with full knowledge that only National Forests were included.

**Response:** The analysis of viability used only those lands in the National Forests within the range of the northern spotted owl. Some assumptions about other Federal and nonfederal lands regarding compliance with the Endangered Species Act were made, but only National Forests were used in the calculations of viability in this EIS. The panel was fully aware of this assumption.

- **Comment:** The assumption of circular HCAs leads to a more optimistic projection of the owl's viability than is likely to be the case in the real world.

**Response:** The model used circular HCAs and assumed 15 pair occupancy. Since HCAs only approximate circles and a 25 percent vacancy of HCAs was expected, most of the Category 1 HCAs were made large enough to hold a minimum of 20 owl pairs where adequate amounts of habitat existed. The capacity of the HCAs compensates for the fact that they are not circular. A more detailed explanation of how the models were used and tested is in the ISC Report, Appendices M and Q.

- **Comment:** The viability analysis should have utilized the model of Drs. Noon and McKelvey.

**Response:** Testing of the model and preparation of the data for model input was not possible in the time available for preparation of this EIS. Both the McKelvey model and the viability analysis for this EIS examined the key fundamental parameters necessary to examine population viability. The McKelvey model (see Appendix D) is a simulation model using complex quantitative relationships and further testing of this model is needed.

The viability analysis used in this EIS, Chapter 3&4, was developed and reviewed by spotted owl and population biology experts. The analysis incorporated tested concepts based on empirical data. The analysis took into account various aspects of population biology such as habitat requirements and dispersal capabilities.

The criteria used in this EIS to assess viability are indices to key population parameters such as size, distribution, and trend. The viability analysis for this document focuses on the amount and distribution of nesting, roosting, and foraging habitat over time. The amount and distribution of habitat are factors that are directly related to implementation of a management plan.

- **Comment:** Explain why the evaluation of population viability for the four alternatives included in the Draft Environmental Impact Statement include LOW and HIGH, but no MEDIUM.

**Response:** The rating system that was used to evaluate all the alternatives had possible outcomes of LOW, MEDIUM, and HIGH likelihood of providing long-term viability of the northern spotted owl across its range. The rating system was capable of evaluating a full range of alternatives. After the viability analysis was completed, no alternative received a MEDIUM rating.

- **Comment:** The viability rating for Alternative B is HIGH. The Oregon Coast Range Province has only 23 pairs and should have either a LOW or MEDIUM viability rating.

**Response:** The rating referenced above was HIGH for Alternative B and represents the overall rating applied throughout the range of the northern spotted owl. It is recognized that the Oregon Coast Range Province is at risk to long-term viability due to current habitat conditions and isolation from other physiographic provinces. The standards and guidelines for the Oregon Coast Range Province reflect this concern in that they allow for Category 3 HCAs to be placed around any future pairs until occupancy of the Category 1 HCAs meet the 20-pair objective. In recent years, as a result of additional surveys, the total number of reported spotted owl pairs in the Oregon Coast Range Province has increased to more than twice the number mentioned in the comment. One of the assumptions of the rating displayed in the viability analysis is that BLM will manage similar to the ISC Strategy and that private land managers will comply with the requirements of the Endangered Species Act.

- **Comment:** The Forest Service should not manage for the northern spotted owl in the Coast Range of Oregon since the province is "dead-ended."

**Response:** Although the Oregon Coast Range Province has poor genetic linkage, the purpose and need of this environmental impact statement is to ensure viable populations of the northern spotted owl across the planning area. Since the Oregon Coast Range is part of the range of the northern spotted owl, it is included in the ISC Strategy and the alternatives developed for this EIS. Furthermore, ingrowth of habitat is expected in designated areas which will provide additional habitat in the future.

- **Comment:** Explain how the viability rating is HIGH for Alternatives B, C, and D but they are different from each other as described in the DEIS.

**Response:** Although Alternatives B, C, and D are different in the amount of northern spotted owl habitat protected, all have a HIGH viability rating because all meet the requirement of ensuring the long-term viability of the northern spotted owl in the planning area. Further discussion and merits of these alternatives are discussed in detail in Chapter 3&4.

- **Comment:** It appears that provisions for dispersal habitat resulted in a HIGH viability rating and no provision for dispersal habitat resulted in a LOW viability rating.

**Response:** Dispersal habitat was considered as one of the criteria used to assess viability, however, it was not the only factor considered. Although Alternative E has provisions for dispersal habitat within the Owl Management Zone it did not receive a HIGH viability rating.

- **Comment:** The DEIS states a HIGH likelihood of viability exists for Alternative B, yet in the ISC Report, all provinces are closer to MODERATE at the 50 year period.

**Response:** The ISC Report stated there is a VERY HIGH likelihood of sustaining a viable population for at least 50 years (Thomas et al. 1990: 39). The team of experts that formulated and conducted the viability analysis for this environmental impact statement used a revised viability analysis from that used in the ISC Report and rated Alternative B as having a HIGH likelihood of viability. The analysis carried the viability calculations out to 150 years. The interdisciplinary team recognized a decrease in habitat at 50 years for Alternative B. Three factors led to the overall HIGH rating. First, total acres of nesting, roosting, and foraging habitat are expected to increase over current amounts by year 100 so long-term likelihood of persistence is high. Second, the habitat decrease at the 50-year point is temporary and the viability analysis shows an increase in subsequent years. And third, because the ISC Strategy calls for well distributed, large clusters of spotted owls, survival and replacement of owls in reproductive pairs is expected to be high.



## Habitat Conservation Areas

- **Comment:** The ISC Report states standards and guidelines that are different from what is actually mapped, for example HCA size and spacing between HCAs. Some HCAs are 20 percent larger than they need to be and contain more than 20 pairs. Please explain the reason for this and discuss generally how the HCAs were delineated.

**Response:** The standards and guidelines in the ISC Report describe minimums for management of northern spotted owl nesting, roosting, and foraging habitat. The standards and guidelines allow for variation throughout the range when actually mapping the Strategy. The team of biologists that mapped the ISC Strategy stated that the reason the size and spacing of mapped HCAs did not conform to the minimum standards and guidelines in Appendix Q of the ISC Report was because modifications were made to incorporate several considerations. Some HCAs were larger because they were isolated from other areas, located in or near areas of concern, or contained high proportions of areas of non-habitat within the HCA. Spacing of HCAs was closer than the minimum called for in the ISC Strategy to take advantage of habitat in Wilderness and known concentrations of spotted owls. Spacing in some cases needed to be closer in order to map HCAs in areas of habitat on Federal lands.

The size of each HCA is based on the need to provide habitat to a minimum of 15 pairs of spotted owls. The formula in Appendix I of the ISC Report uses 20 pairs of owls because it is believed that at any point in time the occupancy will be less than 100 percent. In using 20 pairs instead of 15, the formula allows for a vacancy rate of as much as 25 percent yet still maintain at least the minimum number of pairs (15) functioning at any one time. Habitat capability and cluster size is discussed in the population viability section, in Criteria 3 and 7, respectively.

- **Comment:** For ISC-based strategies, large habitat area protection is good but a complementary system of smaller reserves like SOHAs should also be maintained.

**Response:** Besides the large Category 1 and 2 HCAs, the ISC Strategy calls for smaller Category 3 HCAs which are designed to support single pairs of spotted owls, similar to SOHAs. Additionally, the habitat between designated areas will be managed in accordance with the standards and guidelines in this EIS and Forest Land and Resource Management Plans to afford dispersal within the Forest Matrix between designated areas managed primarily for spotted owl habitat.

- **Comment:** Since Wilderness was used as a starting point along with other protected landscapes, some of the best habitat was missed and not included as part of the ISC Strategy. This good habitat and the spotted owls in it should be included in the ISC Strategy.

**Response:** The lands that were included in designated areas managed primarily for spotted owl habitat, in addition to those areas already protected in Wilderness and/or other reserves, were selected to provide habitat in large blocks and to provide protection to existing pairs. Nesting, roosting, and foraging habitat not included in designated areas managed primarily for spotted owl habitat was not in the appropriate location to meet



spacing requirements or it did not contain spotted owl concentrations. Spotted owls in Wilderness were counted as part of the ISC Strategy (Thomas et al. 1990: 384).

- **Comment:** HCAs should be spaced further apart. The Interagency Scientific Committee admitted that there is no solid scientific basis for the standard that requires a maximum of 12 miles between HCAs.

**Response:** In determining the spacing between HCAs, the Committee had data on the dispersal capabilities of spotted owls. Based on the lengthy discussions of appropriate distances between HCAs, the Committee concluded that the distance between large HCAs (20+ pairs) should be within the observed dispersal distances of at least two-thirds of all radio-tagged juveniles. This was reviewed by five technical experts selected by professional societies. Only one reviewer, Dr. John Wiens, questioned this process. In the Committee's follow-up conversations with Dr. Wiens, he responded that he could suggest no better method for arriving at the decision and that he was satisfied with the two-thirds guideline that the Committee adopted. For additional information see USDA Forest Service, 1991b, Question 31.

- **Comment:** The ISC Strategy assumed that spotted owls in Wilderness and National Parks did not count towards total owls. You should include these owls, as well as current and future habitat within Wilderness in the viability analysis for all alternatives.

**Response:** The population estimates in the ISC Strategy included all known and expected northern spotted owl pairs in Wilderness and National Parks within HCAs. The analysis of habitat capability in this environmental impact statement also includes habitat within Wilderness.

- **Comment:** There are no specific management requirements for each area of concern and Alternative B fails to discuss conservation efforts for these areas.

**Response:** The ISC Report and this document both describe additional conservation measures for areas of concern. Examples are the location of Category 3 HCAs for the Olympic Peninsula, North Cascades East/I-90, Oregon Coast Range, Southern Deschutes and Shasta/McCloud areas of concern. Also, more and larger Category 1 and 2 HCAs were delineated in areas of concern to be responsive to the relatively poor habitat conditions that exist today. The amount of habitat for each area of concern was analyzed and is displayed in criterion 2, and is considered in the overall viability rating. The standards and guidelines in the ISC Report and this environmental impact statement are a result of emphasis on the management of areas of concern for spotted owl habitat.

- **Comment:** Since private lands are so cutover, Federal lands must compensate for these conditions.

**Response:** Federal lands are the cornerstone of all the alternatives presented in this EIS. The quantity and quality of spotted owl habitat in designated areas on public land did

compensate for the amount and location of timber management activities on private lands. Respective state laws provide some protection of spotted owl activity centers.

- **Comment:** Since this is an owl recovery plan, the Forest Service should revise the plan when the owl population reaches the desired level.

**Response:** Neither this environmental impact statement nor the ISC Strategy is a recovery plan for northern spotted owls. A recovery plan is currently being developed by the U.S. Fish and Wildlife Service.

- **Comment:** Early Winters Ski Area does not require HCA protection since timber will be removed only in accordance with approved comprehensive planning process.

**Response:** The need for a Category 3 HCA was established by the ISC Strategy because of the reported presence of northern spotted owls at that site. Any habitat modification will be guided by the standards and guidelines of the selected alternative. Adaptive management proposals for habitat modification are subject to review and approval as presented in Chapter 2.

## The 50-11-40 Rule

- **Comment:** The interdisciplinary team needs to reevaluate the 50-11-40 rule because there's no scientific basis for it.

**Response:** The basis for the 50-11-40 rule came from studies describing stand conditions used by spotted owls for foraging. Research indicates that most foraging occurs in habitat typified by old-growth forest structural characteristics, yet some amount of foraging does occur in younger stands. The environmental impact statement concluded that quarter townships that met the 50-11-40 rule would support foraging and roosting needs for dispersing juveniles, and would likely cover enough of the intervening landscape to allow reasonable protection from predators during random dispersal and movement.

Implementation of the Monitoring Plan (see Appendix J) can provide insight into whether these standards and guidelines could be improved upon, or whether various proposals for standards and guidelines for dispersal habitat in the Forest Matrix (for example, the 40-20'-40 standards and guidelines for the Multi-Resource Strategy) would prove acceptable.

- **Comment:** The 50-11-40 rule could have been different and provided more timber harvest if a different standard was used. You should explore using different standards for the Forest Matrix.

**Response:** The ISC Strategy calls for the 50-11-40 rule to be applied to habitat between HCAs. If the 50-11-40 standard was different it could produce more timber, however the security of dispersing owls would be less than what is believed to be necessary for successful dispersal. Any variation of the recommended level (50-11-40) would result in

either more or less habitat being protected for spotted owl dispersal. A research and monitoring program could provide the additional information needed to reevaluate the 50-11-40 rule. If appropriate, new information would be used to make adjustments through the adaptive management process.

- **Comment:** The Forest Service should accept more than its proportional share of the 50-11-40 rule. In this way the benefits and burdens can be more easily shared by the general public.

**Response:** Some (perhaps many) private lands, depending on the rotation age selected for such lands, would meet the criteria at a given time. The ISC Report called for reevaluation after 3 years. If dispersal is less than satisfactory, the standard may be revised.

## **Development of Silvicultural Methods for Harvest Within HCAs**

- **Comment:** There should be clearer and more descriptive disclosure of the benefits of silvicultural treatments before they are allowed in HCAs. Proposed silvicultural activities should be conclusively demonstrated to be beneficial to northern spotted owl habitat through repeated experimentation before they are used in HCAs.

**Response:** This comment is consistent with direction regarding monitoring and research activities in the ISC Strategy. Silvicultural treatments or other habitat manipulations must demonstrate beneficial effects before they will be implemented in HCAs.

- **Comment:** Explain if designated areas managed primarily for spotted owl habitat in the ISC Strategy-based alternatives can be logged after they are again fully occupied by spotted owls.

**Response:** For ISC Strategy-based alternatives (Alternatives B, C, and D), designated areas managed primarily for spotted owl habitat are needed for both the long-term protection of habitat and to operate as reserves for owls for long-term population viability. The ISC Strategy prohibits the timber harvest of any age class of forest within HCAs with very few exceptions. When all designated areas managed primarily for spotted owl habitat are fully occupied by spotted owls, only one of the above two objectives for designated areas will have been met. The second objective of long-term viability of the northern spotted owl across its range will still need to be met.

## **Comments on Alternative C**

- **Comment:** Under Alternative C, the U.S. Fish and Wildlife Service's Critical Habitat designation dropped the acres included in Wilderness. You should include the spotted owl habitat in Wilderness areas in designated areas managed primarily for spotted owl habitat in your preferred alternative.

## Appendix L

**Response:** The U.S. Fish and Wildlife Services' Critical Habitat final rule did not include some HCA acres because they were already protected as Wilderness, State Parks, or National Parks and Monuments. Critical Habitat did not include the above areas because each one provides adequate protection for the northern spotted owl. Alternative C adds CHUs to HCAs, which includes owl habitat in Wilderness. The interdisciplinary team included all northern spotted owl habitat on National Forests in the viability analysis.

- **Comment:** Forest Service use of Critical Habitat is troubling because Forest Service and Bureau of Land Management were not involved in formulation of Critical Habitat

**Response:** The U.S. Fish and Wildlife Service is responsible for designating Critical Habitat that is needed for the management of listed species. The Forest Service and Bureau of Land Management were both involved in the review of Critical Habitat that the U.S. Fish and Wildlife Service developed. The Forest Service recommended that the ISC Strategy of HCAs was all that was needed to ensure the long-term viability of the northern spotted owl across its range.

## Monitoring Spotted Owl Populations

- **Comment:** Training of spotted owl surveyors is inadequate and unscientific.

**Response:** In the past, surveyors have been trained through classroom and field exercises to become familiar with techniques and local conditions. Generally, experienced surveyors have been paired with inexperienced surveyors for field work. The standard protocols used by the Forest Service have been accepted by the U.S. Fish and Wildlife Service and reviewed for clarity before implementation. In addition, surveyors are evaluated and given opportunities to discuss the variety of circumstances and conditions encountered in their work.

- **Comment:** There is no monitoring program to provide data and feedback for assessing whether and how well the ISC Strategy is working. You should have a monitoring plan.

**Response:** This environmental impact statement outlines a monitoring strategy (see Appendix J). The ISC Report also includes a monitoring plan in Appendix R. The spotted owl Research, Development and Application Program will oversee development of a monitoring plan.



## Timber

### Timber Management - General

- **Comment:** The DEIS failed to adequately address the biological diversity of managed plantations and how plantations, contribute to spotted owl habitat.

**Response:** Both the Interagency Scientific Committee and the interdisciplinary team for this environmental impact statement examined the acreage, age, and growth rates of existing plantations within designated areas managed primarily for spotted owl habitat and have predicted that these plantations will grow into nesting, roosting, and foraging habitat over time. Any management activities conducted within those plantations will have been shown to benefit owl habitat through the research efforts described in the various alternatives.

- **Comment:** The DEIS failed to identify that Pacific silver fir growing stock is decreasing due to timber harvesting practices.

**Response:** This issue is beyond the scope of this document. This FEIS addresses the impacts of various strategies for providing for spotted owl habitat, rather than the impacts of past or proposed timber harvest practices on the status of Pacific silver fir. Each National Forest is required to prepare a Land and Resource Management Plan which provides overall forest direction and identifies the appropriate standards and guidelines to address this issue if applicable.

- **Comment:** Harvested acres should be required to be replanted within six months.

**Response:** The issue of timing of reforestation efforts is beyond the scope of this document. The Forest Service is required to plan for stocking within five years after harvest. Replanting is regularly accomplished within one-to-three years of harvest. This time is necessary to accomplish fuel reduction, planting site preparation, and establishment of the tree seedlings.

- **Comment:** The DEIS (Chapter 2) contains direction that is not understandable to the public with regard to "Reserved Lands" and to "Lands Unsited for Timber Production".

**Response:** The reference to "Reserved Lands" and "Lands Unsited for Timber Production" is a direct quote from the Interagency Scientific Committee's Report, and as such, will be changed here. The Glossary in this environmental impact statement contains definitions for each of these terms and they are discussed in Chapter 3&4. The maps prepared for the FEIS include, for clarification, the acreage of owl habitat within unavailable lands on National Forests.

- **Comment:** The current inventory of reserved lands (3&4-14) is deceptive in that it fails to include lands which are reserved pursuant to the Land and Resource Management

## Appendix L

Plans. By only including the Congressionally mandated or Chief's withdrawn lands, large tracts of lands which are not managed for timber production are overlooked.

**Response:** This table is for information only, and our definition of "reserved" is limited to the lands mentioned in the comment. Subsequent tables associated with various analysis discussions include another category called "unsuitable" lands, to reflect the other "non-timber production" lands mentioned. These lands were not overlooked in the viability analysis.

- **Comment:** The DEIS incorrectly states that the silvicultural system of clearcutting closely duplicates the natural regeneration methods, such as fire, in Douglas-fir forests.

**Response:** The text in the FEIS has been changed to address this concern.

- **Comment:** The DEIS fails to disclose past lack of requirements to retain wildlife trees, downed woody material, riparian buffers, or shade in clearcut areas. The DEIS also fails to discuss past indiscriminate use of herbicides.

**Response:** It is beyond the scope of this document to assess the effectiveness of past timber harvest practices. Standards and guidelines are incorporated in Forest Land and Resource Management Plans to address the resource concerns cited in this comment.

- **Comment:** The DEIS failed to disclose the impacts on visual quality corridors due to increased cutting to compensate for ASQ lost by designating areas for spotted owl habitat.

**Response:** There will be no increase in timber harvest in visual corridors. The Forests will manage the visual corridors according to the standards and guidelines as stated within the Forest Plans. Visual quality objectives will not be modified to compensate for the reduced ASQ resulting from designating areas managed primarily for spotted owl habitat.

- **Comment:** The DEIS did not adequately discuss the effect on Alternative B of implementation of the Knutson-Vandenberg Act, and did not define "large workload".

**Response:** This section has been clarified in the FEIS and the reference to "large workload" has been removed.

- **Comment:** The DEIS fails to identify the funding source for monitoring of the spotted owl. Will Knutson-Vandenburg (KV) funds be utilized?

**Response:** Funding for monitoring will be requested through the normal annual budgeting process. It is normally inappropriate to use KV funds for monitoring.

- **Comment:** The DEIS did not use standard statistical analysis techniques to minimize the effects on spotted owls, ASQ and economics.

**Response:** In both the DEIS and the FEIS, the best available techniques and information were utilized. The analytical techniques commonly accepted within the scientific community were utilized in the spotted owl analysis to quantify the anticipated effects on spotted owls, ASQ and economics.

- **Comment:** In the "More Intensive Management" section of the DEIS, the statement that most suitable timberland is "programmed for a proper balance of intensive timber and non-timber resource management" is incorrect. Timber management has traditionally been a much higher priority, to the detriment of recreational uses.

**Response:** The objectives, levels, or intensities of management activities on the suitable timber land base is addressed through the Forest Land and Resource Management Plan for each National Forest. The discussion in the DEIS was intended to address the fact that timber management intensity could not be substantially increased without reductions in other resource outputs, such as recreation.

- **Comment:** The alternatives overestimate the decline in spotted owl habitat. Temporary delays or permanent modifications of future timber sales from appeals or lawsuits will effectively maintain more spotted owl habitat than you predict. These lawsuits or appeals are often based on locations of new spotted owl populations or on other resource issues which affect owl habitat.

**Response:** Owl habitat not specifically protected in the selected alternative is available for other uses scheduled under the appropriate Forest Plan. Anticipating delays or changes to the timber sale program from lawsuits or appeals is outside the scope of this document and would affect all alternatives similarly.

- **Comment:** The Plan must provide for a diversity of all age classes in each forest type.

**Response:** Forest Land and Resource Management Plans already require the provision for biological diversity and diversity of age classes.

- **Comment:** The DEIS does not define "sustained yield".

**Response:** This term has been added to the glossary in the FEIS.

- **Comment:** The DEIS does not explain and define how an area is determined to be suitable for timber production.

**Response:** This concern is addressed in Chapter 3&4, Forests and Timber Management, and in the Glossary of the FEIS.

## Research Related to Timber Management

- **Comment:** There is an 8½-year-old silvicultural research study plot installed by researchers at Oregon State University that is located within a Habitat Conservation Area in Oregon. There is concern that research activities will not be allowed due to spotted owl habitat protection.

**Response:** The Chief of the Forest Service has established a Northern Spotted Owl Oversight Team. Their purpose is to evaluate and determine if project proposals such as this ongoing study plot would be consistent with the ISC Strategy, and to make recommendations to the Steering Committee.

- **Comment:** The Forest Service should install experimental plots and test different silvicultural systems to determine if habitat and management activities that contribute to allowable sale quantity (ASQ) are compatible.

**Response:** The Forest Service currently has ongoing spotted owl-related research activities with the Northern Spotted Owl Management Research, Development and Application Unit, with the Pacific Northwest Forest and Range Experiment Station, and with the Pacific Southwest Forest and Range Experiment Station. The ISC Report discusses several areas of research and encourages the Forest Service to conduct the research to determine if spotted owl habitat can be silviculturally manipulated to develop or maintain spotted owl habitat. See Appendix R and Appendix S of the ISC Report for more information.

- **Comment:** Initiate research to design silvicultural systems that allow for maintaining the productivity of the forest while still protecting other resources like the spotted owl. This should provide for substantial increases in ASQ and likely increase the amount of spotted owl habitat.

**Response:** Research is ongoing to develop selection systems and harvest methods other than clearcutting, as well as to define habitat needs for the northern spotted owl. Research is also under way as called for in the ISC Strategy that will develop or identify silvicultural treatments that will benefit spotted owl habitat. Methods that meet the needs of owls and produce timber products will no doubt be identified. Use of such a strategy in place of designating specific areas to be managed for owl habitat was not considered as an alternative in this document because uncertainties in its potential success were not compatible with the need to move quickly to protect the threatened northern spotted owl.

- **Comment:** The standards and guidelines for HCAs should define, "silvicultural treatments that have been tested or demonstrated through experimentation." The requirements for testing and demonstrating should be set forth.

**Response:** Appendices S and R of the ISC Report explain the process for identifying silvicultural treatments that will be appropriate in HCAs. Only those treatments shown to benefit spotted owl habitat will be used. The ISC Report recognizes that research and



experimentation are needed to identify structural habitat needs and to assure that these characteristics can be created silviculturally, before any treatments are undertaken.

## **Timber Management Opportunities and Alternatives**

- **Comment:** The DEIS failed to address managing old-growth habitat and “growing” it for spotted owl habitat. These stands should be managed for long rotations with commercial thinnings. Rotation age should not be established by culmination of mean annual increment. You should extend the rotation to a later age.

**Response:** The ISC Strategy did identify the need to grow future owl habitat. Stand management techniques such as extended rotation and commercial thinnings will undoubtedly be explored through research and experimentation under ISC Strategy recommendations. Many of the currently available silvicultural practices that leave various structural components within the stand should contribute to spotted owl habitat earlier than even-aged plantations. However, the complete set of structural components necessary for spotted owl nesting, roosting, and foraging habitat is not yet fully understood. Until critical components are identified, it is difficult to demonstrate that stands can be maintained silviculturally.

- **Comment:** The alternatives in the DEIS fail to recognize that the use of alternative silvicultural and harvesting techniques within designated areas managed primarily for spotted owl habitat would either benefit or at least be compatible with the habitat needs of the northern spotted owl. Examples include uneven-age (selective) harvesting only, helicopter yarding, smaller and better designed units, precommercial and commercial thinning to grow large trees faster, and release treatments. These treatments would enable the Forest Service to manage forests for both wildlife habitat maintenance and timber production.

**Response:** Under the ISC Strategy in Alternatives B, C, and D, and under the Multi-Resource Strategy in Alternative E, there are provisions for research and experimentation relative to the use of silviculture to maintain or improve owl habitat. If this research demonstrates silvicultural treatments are beneficial to owl habitat, there is a process by which they can be applied to designated areas managed primarily for owl habitat. Research is needed to define the essential components of habitat. Spotted owl nesting, roosting, and foraging owl habitat is very complex; the key flying squirrel prey-base feeds on a fungus dependent on the litter layer; suppressed or understory trees seem to be primary perching places; the mix of size classes, openings, and debris such as down logs and limbs function in complex ways to provide for food for the owl and the owl prey species while at the same time not favoring other species that would successfully compete with the spotted owl for these components of the habitat. Silvicultural treatments clearly providing more benefit than risk may be approved early. Examples may be precommercial and early commercial thinning, or treatments of fuelbreaks and stands prone to catastrophic insect and/or disease outbreaks. But until spotted owl habitat is more fully understood, protection of stands in a manner known to favor owls, e.g., no treatment, is what the ISC Strategy recommends.

## Appendix L

- **Comment:** Silvicultural treatments to manage for spotted owls should be different for California than for the Pacific Northwest.

**Response:** The Interagency Scientific Committee Report and interdisciplinary team for this document have considered the evidence and research available regarding owl habitat and locations in California. The evidence does not warrant the development of different standards and guidelines for California at this time. Changes can be made under the "Adaptive Management" process if and when a need for different standards and guidelines is identified.

- **Comment:** The DEIS fails to examine the silvicultural opportunities for more intensive management of land suitable for timber production on National Forests. Growth increases are possible through fertilization and by shortening rotation age.

**Response:** This environmental impact statement discusses opportunities to mitigate ASQ effects through more intensive management and concludes that these opportunities are limited. Fertilization is included in some Forest Plan ASQ projections, as are genetic improvements, short rotations, competition control, thinning, and so forth. The use of even more intensive treatments is limited by costs, or cost/benefit ratio, and by the need to manage the National Forests for more than just timber production. Shortening a rotation age to 60 years, for example, and thereby cutting one-sixth of the area each decade, is often not compatible with the management of visual resources, watersheds, wildlife habitat, and soils. Maximizing outputs such as timber production in a manner consistent with other resource protection and output levels is the subject of individual Forest Land and Resource Management Plans. ASQs displayed in this document simply display the interdisciplinary team's best estimate of what those outputs might be.

- **Comment:** Alternatives B, C, and D should be modified to preclude all harvesting of timber under contract within HCAs, and should not allow substitution for this volume.

**Response:** The alternatives balance the need to ensure viability of northern spotted owls with the social and economic impacts of harvesting timber sales which are under contract. The viability analysis in the EIS reflects the effects of this harvesting.

- **Comment:** Harvesting in the roadless areas (released in the 1984 Wilderness Act) at low intensities (one to two percent) would maintain or increase owl habitat and meet much of the first decade ASQ.

**Response:** The decision as to where and how to harvest in specific areas is made through the NEPA process for specific projects.

- **Comment:** The "no action" alternative, Alternative A, is incorrect regarding the four northern California forests. These forests do not have Forest Plans in place, and hence the "no action" alternative for these forests should be the continued implementation of the existing timber management plans.

**Response:** The ASQs listed in this environmental impact statement for the California Forests represent the interdisciplinary team's best estimate, as of early 1990, of the ASQs under the standards and guidelines currently in place in the Regional Guide for the Pacific Southwest Region. As such, these represent the ASQs achievable under Alternative A.

## **Forest Health**

- **Comment:** There must be a provision within the standards and guidelines for salvage when the neighboring stands are threatened by insects, disease and fire problems within the habitat areas.

**Response:** Under Alternative A, the decision to manage spotted owl habitat areas (SOHA's) is made through the Forest Plans, the NEPA process and biological evaluations. These decisions must comply with the standards and guidelines for the Forest Plan. Under Alternatives B, C, and D, these project proposals would be evaluated by the Oversight Team and the Steering Committee to determine their compliance with Forest Service standards and guidelines for spotted owl habitat management.

- **Comment:** Salvage sales should not be permitted within spotted owl habitat because they would reduce the old-growth component and reduce habitat for prey species and foraging opportunities.

**Response:** Salvage logging is permitted under Alternative A in accordance with approved SOHA management plans. For Alternatives B, C, and D, recurring salvage logging is not allowed under the ISC Strategy. Any proposals for salvage logging due to special circumstances must be evaluated on a case-by-case basis by the Oversight Team and Steering Committee to determine if the action is consistent with the ISC Strategy.

- **Comment:** Clearcutting should not be allowed. Harvesting 20 percent of the total amount of trees by selection harvesting only, and allowing the healthy old-growth trees to remain, is all the long-term health of the forest can allow.

**Response:** This FEIS addresses various levels and strategies to provide for spotted owl habitat, however it does not address the type, intensity, location, or effects of specific silvicultural treatments (i.e., clearcutting, selective cutting). The decision to implement specific silvicultural treatments is made through project-level analyses.

## **The 50-11-40 Rule**

- **Comment:** The 50-11-40 rule is unacceptable because clearcutting 50 percent of the forest would severely damage watersheds causing increased slides, soil erosion, and fluctuations in water temperature. Thinning instead of clearcutting would provide for wildlife habitat and corridors between reserves. Clearcutting would continue to damage forest resource values such as scenic quality, fishing, hiking, bird watching, hunting and kayaking.



**Response:** It is beyond the scope of this document to evaluate the type and intensity of alternative harvest methods for specific project areas. The Forest Land and Resource Management Plans already provide standards and guidelines which protect resource values from these impacts. Since the 50-11-40 rule would be applied in addition to these existing standards and guidelines, no watershed would be 50 percent clearcut at any one time.

- **Comment:** The DEIS does not adequately clarify the application of the 50-11-40 rule.

**Response:** The FEIS states that the 50-11-40 rule is to be applied to the Forest Matrix outside of designated areas managed primarily for spotted owl habitat. Interpretation of the 50-11-40 rule is clarified in the set of questions and answers about the ISC Strategy incorporated by reference into this environmental impact statement.

## Mitigation Measures and Forest Management Direction

- **Comment:** Your alternatives are incomplete because of a lack of additional mitigation measures or management practices that should be included in each alternative. For example:

The DEIS neither identifies the standards affecting disease management activities (e.g., Port-Orford-cedar root disease control) nor indicates whether they would, in fact, hinder existing disease management practices.

Disease and fire management references leave it unclear whether practices will continue as they are, or be adjusted to apply to spotted owl habitat.

**Response:** The alternatives in this environmental impact statement provide direction for management and mitigation not only through their own standards and guidelines, those of the selected alternative added to the existing Regional Guides, Forest Plans, and other land and resource management direction ("Mitigation and Resource Management Direction", Chapter 2.) alternatives incorporate the standards and guidelines, mitigation measures, and monitoring plans of the existing Land and Resource Management Plans. Projects also have site-specific mitigation measures (see "Implementation" for each alternative in Chapter 2).

The standards and guidelines applicable to designated areas managed primarily for owl habitat in Alternatives B, C, and D include the entire ISC Strategy and the three sets of clarifying questions and answers. Although this management direction precludes scheduled timber harvesting, most salvage, and other actions that will be detrimental to spotted owl habitat, there are numerous citations permitting activities not detrimental to habitat. In particular, these include an "Other" note at the end of the April 30, 1991, question and answer set, that, after citing several examples of potential disturbances to spotted owls including pesticide spraying, tree falling, yarding, hauling, precommercial thinning, and so forth, states:

"After reviewing these issues, it was concluded that specific guidelines were inappropriate. These issues are management decisions and should be handled through the biological evaluation process on a case-by-case basis. In general these types of



activities are most significant if they are within a quarter-mile of a known nest or activity center of a pair of spotted owls, although each case may be unique and should be reviewed on a case-by-case basis. Any time there is a question as to whether a given action may impact spotted owls it should be reviewed by a biologist familiar with the situation."

Further, the standards in the ISC Strategy permit:

"Silvicultural treatments that have been tested or demonstrated through experimentation to facilitate the development of suitable habitat....."

These quotes highlight routine forest management practices that are not a detriment to the spotted owl and its habitat and which are permitted. Further, silvicultural treatments which have demonstrated to benefit the owl and its habitat are permitted. The options available to deal with insect and disease problems will be numerous and varied. Proposals will be evaluated on a case-by-case basis using the above protection standards. Some treatment options will be judged inappropriate within designated areas because of these standards. An example may be the salvage of root-disease killed Port-Orford-cedar. On the other hand, simply killing but not removing the disease-killed cedar may be judged to be consistent with the standards and guidelines. No detailed set of standards and guidelines could meet every circumstance.

The Forest Service has set up an Oversight Team to make recommendations to a Steering Committee. It is the Oversight Team's chartered responsibility to:

"Evaluate proposals to determine consistency with the adopted strategy and report the evaluation and recommendations to the Steering Committee."

In Alternatives B, C, and D, proposals determined by the Oversight Team and Steering Committee to be inconsistent with the objectives of the ISC Strategy will be referred back to the proposing unit for modification or abandonment.

Insect and disease control, including Port-Orford-cedar root disease control, and fire/fuels management activities will only be conducted under one of the above two guidelines; e.g., either will not be a detriment to spotted owl habitat or the activity has been demonstrated to benefit spotted owl habitat. Thus, and as stated in the DEIS, *if* (interpretation of) the ISC Strategy precludes, for instance, disease or fuel treatments, certain results can be expected. These effects are displayed for the decision maker. These effects are also displayed to serve as a starting point for evaluation of individual treatment proposals.

Treatments within designated areas managed primarily for spotted owl habitat (e.g., HCAs) must be evaluated based on their predicted affect on owl habitat, (both inside and outside of designated areas and over the short and long term), and not on other objectives.

- **Comment:** The alternatives do not adequately describe and specify what protection measures are needed for HCAs.

**Response:** This environmental impact statement and the ISC Strategy recognize and display risks to HCAs, particularly from fire, insects and diseases, and other catastrophes.

## Appendix L

HCA management plans to address these hazards are recommended. Further site-specific protection measures would be planned at the Forest level.

- **Comment:** The DEIS does not adequately specify the nature or effectiveness of the standards and guidelines, Best Management Practices, or mitigation measures on non-timber values.

**Response:** The effects of the standards and guidelines on non-timber resources is included in Chapter 3&4. The effect of other existing standards and guidelines, Best Management Practices, and mitigation measures are included in Forest Plans, and thus are outside the scope of this document.

## Timber Productivity and Allowable Sale Quantity

- **Comment:** We are unable to determine the impacts of the Category 3 HCA management direction because the amount and location of the acres needed in category 3 HCAs is unknown. The public and the deciding official do not understand the implications of the ISC strategy and they should.

**Response:** This EIS accounted for all category HCAs including category, 3 HCAs delineated through October 1991 in the analysis of impacts. Although the number of future category 3 HCAs needed to fully implement the strategy is unknown, the impact of delineating any additional category 3 HCAs is anticipated to be slight across the entire range of the northern spotted owl. The Forests that have direction to delineate new HCAs, may or may not need to add them depending on the number of new owls found within category 1 HCAs. The eventual number of additional category 3 HCAs that may be needed cannot be calculated at this time.

- **Comment:** The Forest service has overestimated the amount of timber the National Forests can produce by at least 8 percent compared to what the Scientific Panel on Late-Successional Forest Ecosystems reported. The panel also reported that FORPLAN has overestimated the Forest Plan ASQs by 15 percent.

**Response:** The Forest Service considers the Forest Plan ASQs to be accurate as presented. The four-person Scientific Panel used a more conservative set of assumptions than this interdisciplinary team believes was appropriate. In any event, the ASQs presented in the EIS are intended as estimates of effects for the various alternatives, and as such, accurately display the relative differences among the alternatives and thus present the decision maker with sufficient information to make a reasoned choice among the alternatives.

- **Comment:** All of your ASQ projections are based on the false assumption that there will be an unlimited supply of wood for future generations.

**Response:** Forest Service harvests are limited by policy to levels that can be sustained over time. None of the projections in this environmental impact statement are based on an unlimited supply.

- **Comment:** Excluding old growth, what is the estimated ASQ that will become available during the third, fourth, and fifth decades?

**Response:** The analysis does not predict the "old growth" portion of the ASQ. "Excluding old-growth" is outside the scope of this EIS. Readers wishing to estimate this effect would be aided by the discussions in Chapter 3&4 under Modeling Details and Technical Constraints, and also in Appendix B under "Forest Regulation and One Reason for the Use of Regeneration Harvesting". First decade ASQs listed in the document are calculated under a policy of non-declining flow, which means they are no higher than ASQs that can be achieved in all future decades.

- **Comment:** The DEIS incorrectly defines the "no action" alternative to mean implementation of SOHAs as defined in the Forest Plans. The "no action" alternative should reflect the Forest Service's current management [consistent with the ISC Strategy]. The ASQ levels under Alternative A are significantly higher than current (no action) management.

**Response:** The FEIS states that Alternative A is the implementation of direction in current Forest Plans which includes a network of spotted owl habitat areas. The ASQs for Alternative A are, by definition, the same as those proposed by the Forest Plans. From September 29, 1990, until March 9, 1991, the Forest Service direction was to manage not inconsistent with the ISC Strategy (see Alternative A, Introduction).

- **Comment:** The DEIS failed to analyze ASQ for extended periods of time, such as three or four fifty-year periods under the various alternatives considered.

**Response:** Standard analytical modeling techniques were utilized to project ASQ for each alternative considered in detail. The standard model is FORPLAN, and the harvest rates were scheduled for an average of 150 years to insure that the harvest level could be sustained.

- **Comment:** How will the 42 percent reduction in old-growth harvest of the third, fourth, and fifth decades be compensated for to insure an ASQ comparable to the first and second decades? The FEIS needs to disclose the nature of the types and amount of stands which would contribute to the ASQ for the third, fourth, and fifth decades.

**Response:** The old-growth figures in this environmental impact statement are for "existing" old-growth forests only, and do not consider ingrowth. Harvest schedules in later decades rely on other, currently younger, stands and eventually on plantations; harvesting each as it matures. This scheduling, which includes only "suitable" timberlands, results in a calculated ASQ that can be maintained in perpetuity. This subject is discussed in more detail in Appendix B of the EIS.



## Pacific Yew (*Taxus Brevifolia*)

### Pacific Yew - General

- **Comment:** The DEIS fails to discuss the possibility of planting Pacific yew to provide a second layer of vegetation in a multistoried stand to add structural diversity, and fails to disclose the impacts of the alternatives on the relationship between spotted owls and Pacific yew.

**Response:** The text of the FEIS has been expanded to acknowledge the use of understory yew trees by spotted owls and to note that the Forest Service is scheduling plantings of Pacific yew. A separate environmental impact statement on the management of Pacific yew is being prepared.

- **Comment:** The DEIS does not adequately describe the impacts on the amount of taxol that can be produced annually, the number of beneficiaries, the kinds of cancers that taxol is effective against, and the percentage of yew already in other "set-aside" areas (Wilderness, etc.).

**Response:** These effects are beyond the scope of this environmental impact statement. Each of the alternatives have provisions for evaluating proposals to manage the Pacific yew resource within designated areas managed primarily for spotted owl habitat.

### Taxol Sources

- **Comment:** The DEIS did not adequately discuss Pacific yew; specifically, that taxol is also found in the needles of Pacific yew and not just in the bark.

**Response:** Appendix I in the FEIS notes that taxol is found in the needles and that needles may contribute to the total taxol needs in the future. This reference has been added to the discussion of Pacific yew in Chapter 3&4.

- **Comment:** The DEIS appendix on Pacific yew overestimates the likelihood of alternative taxol sources to replace natural Pacific yew sources derived from Region 6 National Forests. Taxol synthesis, partial synthesis, tissue culture, and cultivated yew plantations are certainly being explored, but, contrary to the statement in the appendix, none of these sources are likely to come on-line to supply significant quantities of taxol by 1995.

**Response:** Due to the current high interest by the National Cancer Institute in Pacific yew, and specifically taxol, a substantial amount of funding is being expended to determine if taxol can be produced synthetically. The National Cancer Institute, as well as the Forest Service, is optimistic that taxol can be produced from alternative sources in a relatively short period of time.



## **Yew Availability**

- **Comment:** The DEIS underestimates the amount of Pacific yew that may be harvested over the next 5 years. The 29 million Pacific yew trees that are alleged to exist include all size classes, whereas the yew trees targeted for harvest are about 10 inches in diameter. Experts estimate that there may be only 1.2 million yew trees in the 10-inch size class, so the present annual rate of harvest is not 1 to 2 percent as cited in Appendix I, but more like 25 percent of the available trees in the harvestable size class.

**Response:** The data cited is based on the most current information and the discussion describes what is expected to happen under Alternative A. Alternatives E, B, C, and D propose increasing amounts of designated areas managed primarily for spotted owl habitat. This designation could reduce the amount of Pacific yew harvest. The discussion in the EIS permits a comparison of the alternatives and a reasoned choice among them. Currently, an EIS is being prepared for the management of Pacific yew and additional inventory data is being collected.

- **Comment:** The DEIS does not provide enough known information about the status of Pacific yew (i.e., the complexity of yew habitat regarding proximity to water, slope position, elevation, and vegetative cover), and therefore does not adequately assess the risk to Pacific yew.

**Response:** The overall management of Pacific yew is outside the scope of this EIS. The alternatives do not affect yew other than to potentially reduce its accessibility. Management of Pacific yew is the subject of a separate EIS now being prepared.

## Insects and Diseases

- **Comment:** The DEIS does not adequately address the range of alternative management techniques for controlling Douglas-fir bark beetle, and also does not define the term “stocking control” as used in Appendix G.

**Response:** The risk and consequences of Douglas-fir bark beetle on spotted owl habitat is documented in Appendix G. Proposals to manage for, or control impacts from, Douglas-fir bark beetle would be evaluated by the Oversight Team and the Steering Committee (Alternatives B, C, and D). The Glossary of the FEIS has been updated to include the term “stocking control”.

- **Comment:** The DEIS states (in Appendix G) that in stands east of the Cascades, the potential consequences without preventative treatment for insects and disease complexes would be the long-term loss of spotted owl habitat. The DEIS does not adequately address the need for long-term replacement habitat if these consequences occur.

**Response:** The FEIS documents the current conditions of insect and disease complexes and describes potential effects if preventative treatments are not implemented. Each of the alternatives propose a process for evaluation and implementation of treatments for insects and diseases which would promote long-term maintenance, development, or enhancement of spotted owl habitat.

- **Comment:** The DEIS does not adequately address the need to control white pine blister rust, nor does the FEIS reflect the Forest Service management direction on preserving rust-resistant sugar pines.

**Response:** The issue of prevention and control of white pine blister rust is beyond the scope of this document. Designation of areas to be managed primarily for spotted owl habitat is not expected to negatively affect the Forest Service’s ability to manage blister rust.

- **Comment:** You are incorrect in stating that unmanaged HCAs will succumb to insects and diseases. Allowing larger tracts of land to mature naturally over several hundred years is likely to increase the age and diversity of species, thus *decreasing* the likelihood of widespread insect infestation and disease. Even-aged stands of genetically-similar, single-species timber, common in previously-logged and replanted areas, are actually the most vulnerable to insect infestation and disease.

**Response:** Large areas of single-species management could be susceptible to loss from one insect or disease outbreak. However, plantations currently being installed by the Forest Service seek to include all of the species naturally found on the site, and more effort is being made to retain many of the trees from the preceding stand. In any event, the risk of insect or disease loss in existing plantations is substantially less than in unmanaged stands. As stated in the EIS, if no treatment or protection is done in designated areas

managed primarily for spotted owl habitat, particularly east of the Cascades, there will be a gradual shift towards shade-tolerant species. These species are generally more susceptible to insects and diseases. In addition, overstocked stands in these areas can lead to increased insect mortality during drought periods.

## Port-Orford-Cedar

- **Comment:** The DEIS does not adequately provide for management of Port-Orford-cedar root disease.

**Response:** Specific management plans for control of Port-Orford-cedar root disease are beyond the scope of this document. An Action Plan has been developed for the control of this disease. Proposed treatments within designated areas managed primarily for spotted owl habitat would be evaluated by the Oversight Team.

- **Comment:** The Port-Orford-cedar Action Plan referenced in the DEIS has not been proven to be effective and has not been reviewed scientifically. Removal of infected Port-Orford-cedar does not stop the disease, it just benefits industry. The biggest risk to Port-Orford-cedar is management in currently uninfected drainages. Alternatives protecting more of these areas would be best for Port-Orford-cedar.

**Response:** The effectiveness and scientific review of the Port-Orford-cedar Action Plan is beyond the scope of this document.

- **Comment:** The DEIS does not support the statement that aggressive salvaging of trees killed by Port-Orford-cedar root disease is essential to control the disease.

**Response:** The text of the FEIS has been expanded to address this concern.



## Fire and Fuels Management

### Fire Management - General

- **Comment:** The DEIS discussion on Fire and Fuels Management is inadequate because it provides no references.

**Response:** The discussion in the FEIS is authored by fuel managers who are personally experienced and familiar with policies, effectiveness, strategies, inventories, burning conditions, plans, budget processes, prescriptions, and risks associated with fuels management programs on the National Forests.

- **Comment:** The DEIS does not outline fire management techniques to be applied in designated areas managed primarily for spotted owl habitat.

**Response:** The proposal and implementation of specific fire management techniques would be covered by site-specific project analyses. Under Alternative A, proposals within spotted owl habitat areas are evaluated through Forest Plan, biological evaluation, and NEPA processes. Under Alternatives B, C, and D, proposals, generally within fire management plans, would be evaluated by the Oversight Team and Steering Committee to determine consistency with the standards and guidelines of the ISC Strategy.

### Catastrophic Fire Potential

- **Comment:** The potential exists for catastrophic fire in unmanaged and unroaded forests in designated areas managed primarily for spotted owl habitat.

**Response:** The potential for catastrophic fires is discussed in the FEIS (Appendix F - Fire and Fuels Management). Project proposals to respond to extreme risk can be addressed under the various alternatives. Under Alternative A, fuel reduction/management activities are proposed and evaluated through Forest Land and Resource Management Plans and the biological evaluation process. Under Alternatives B, C, and D these proposals would be reviewed by the Oversight Team to ensure consistency with the ISC Strategy. The ISC Strategy recommends the development of plans to reduce potential hazards and recognizes the opportunities to reduce such hazards.

- **Comment:** The DEIS incorrectly states that more timber harvesting activities leads to less wildfire.

**Response:** The EIS acknowledges an increased risk of ignitions related to access and management activities. However, as stated in the EIS, if fuel treatment activities normally associated with and funded by timber sales are completed, the overall risk of loss due to catastrophic fire should be reduced.

## Fuels

- **Comment:** The DEIS failed to quantitatively analyze the natural fuel buildup in HCAs with no timber harvest.

**Response:** The FEIS provides a discussion of the affected environment and a comparison of the alternatives pertaining to fuel accumulations and fire risk in HCAs (Appendix F and Chapter 3&4). See the response elsewhere in this section regarding the need for management plans in HCAs that could respond to critical fuel buildup. The qualitative discussion in the FEIS provides the decision maker with sufficient information on this subject to make a reasoned choice among alternatives.

- **Comment:** The DEIS does not address (in Appendix F) the need to consider dead and downed material for spotted owl habitat when the Forest Service pursues strategies to reduce hazardous fuels in HCAs.

**Response:** This environmental impact statement and the ISC Report recognize the need for further research to fully understand the components and complexity of spotted owl habitat, including the role of dead and downed material. Any project proposals to modify hazardous fuels in designated areas managed primarily for spotted owl habitat would be evaluated to ensure consistency with the habitat needs of the northern spotted owl.

## Fire Prevention and Suppression

- **Comment:** The Draft fails to adequately address forest fire prevention and firefighting capabilities in designated areas managed primarily for spotted owl habitat. Currently, timber operators have personnel and heavy equipment in the forest and have the ability to respond quickly to fire suppression activities. In addition, the DEIS failed to recognize the liability of the Forest Service to private landowners if wildfires starting in spotted owl habitat move onto private lands.

**Response:** None of the proposed alternatives prohibit firefighting or fire prevention efforts within designated areas. The FEIS identifies the need to develop fire management plans for HCAs. These plans will identify various resource needs and treatments to protect spotted owls and/or habitat. The FEIS documents the increased risks of ignitions as a result of increased road access and management activities. There is no reason designation of areas managed primarily for owl habitat would increase fire liability any more than the designation of a Wilderness or scenic corridor.

- **Comment:** The DEIS does not adequately describe actions to be taken in the event of wildfires in HCAs.

**Response:** The standards and guidelines for the alternatives state the need to develop fire management plans for each designated area managed primarily for spotted owl habitat. The current direction for controlling wildfires in these areas is contained in the Forest Plans. Each alternative establishes a need for development of a fire management plan for each of these areas.

## Old-Growth Forests

- **Comment:** Old-growth forests of Oregon were described as ecological deserts in 1792, and that early assessment is better than the current situation.

**Response:** Recent research has shown that old-growth forests are biologically very complex. Old-growth forests, in conjunction with the other seral stages of vegetation development, are critical to the overall biological diversity of National Forests.

- **Comment:** The DEIS identified that California old-growth forest acres could be maintained for 50 years in all alternatives and therefore spotted owl habitat should not be a problem. California should not be considered in the analysis.

**Response:** This EIS focuses on management of spotted owl habitat, not old growth. The amount of owl nesting, roosting, and foraging habitat in California is considerably more than the 650,000 acres identified as old growth. California is included in this analysis because spotted owl habitat is currently being reduced by timber harvest activities in California.

A discussion of how each alternative affects the old-growth resource is included in Chapter 3&4. Five-decade declines in existing old-growth forests are 18 percent under Alternative A, and 11 percent under the proposed action (Alternative B).

- **Comment:** An interim strategy designed to form continuous corridors of large blocks of old growth forests left in an undisturbed state might be a better solution for protecting the owl while allowing for other concerns which must be addressed in planning the future of the forest.

**Response:** Alternatives B, C, and D (and to a much lesser extent, Alternative reflect in part, this strategy. Alternative D places 79 percent of existing old growth within designated areas managed primarily for owl habitat. A 'continuous corridor' is considered more than necessary to ensure viability of the spotted owl. Protection of old-growth forests for other purposes is discussed in Forest Plans and is outside the scope of this document.

- **Comment:** The DEIS hints at some reductions in the 50-11-40 rule for Northern California without fully describing the consequences of doing so. This may lead to a failure of the proposed action to provide connectivity. Stay with the 50-11-40 rule.

**Response:** The FEIS recognizes that provincial differences may be discovered through the efforts of research and experimentation, and standards and guidelines may be adjusted through the adaptive management process to respond to these differences. The 50-11-40 rule would be modified if it was determined that some other standard would meet the dispersal needs of the spotted owl.

## Appendix L

- **Comment:** "Significant old growth", as defined by the Scientific Panel on Late-Successional Forest Ecosystems, should be added to the HCAs.

**Response:** This is outside the scope of this environmental impact statement.

- **Comment:** It is unclear whether the proposed action would allow younger stands to mature into old-growth forests over the next 100 to 200 years in order to sustain equivalent old-growth forest acreage over the long term considering the timber management prescriptions for salvage.

**Response:** The amount of old-growth forests expected over the long term is outside the scope of this EIS. This EIS also does not address the effects of ingrowth with respect to old growth. Alternative A, (current Forest Plan direction) provides over 3 million acres of old-growth forest not scheduled for timber production and the other alternatives provide higher levels under their standards and guidelines. There are an additional 6.6 million acres of forest land not scheduled for timber production from which ingrowth can occur. Each alternative except Alternative A effectively increases the amount of old-growth forests retained over the long term, and increases the amount of forest that will grow into old growth, undisturbed by timber harvest. The EIS does discuss the ingrowth of spotted owl nesting, roosting, and foraging habitat.

- **Comment:** The DEIS seriously understates the projection of old growth forest habitat because it does not consider ingrowth, and hence the discussion of the environmental consequences is flawed.

**Response:** The preservation or creation of old growth is not the objective of the proposed action. There is much debate over the rate old-growth forest ingrowth, but the significant public concern is generally retention of *existing* old growth. The effect of the various alternatives on existing old growth is displayed in the EIS, which states that ingrowth is not included. Failure to include ingrowth, a factor similar in all the alternatives, has little effect on the analysis with respect to comparing alternatives or analyzing the potential effectiveness of the proposed action.

- **Comment:** The FEIS needs to disclose any plans (acres and proposed methods) to create new areas of old-growth stands within the suitable land base.

**Response:** This comment is beyond the scope of this document. The specific objectives and plans for the suitable land base are covered by the Forest Land and Resource Management Plan for each National Forest. It could be noted, however, that harvest rates proposed for some suitable lands are so low that old-growth characteristics may be maintained indefinitely.



## Wildlife and Threatened and Endangered Species

### Marbled Murrelets

- **Comment:** Marbled murrelets should be shown as part of the alternative analysis.

**Response:** This environmental impact statement displays the number of murrelet sites protected with each alternative across the range of the northern spotted owl.

### Big Game

- **Comment:** Big game and bird foraging areas will be foregone in HCAs and cover may be lost in the intervening habitat (Forest Matrix) due to overcutting.

**Response:** Species that rely on early-successional forests will not find many areas within HCAs, or other designated areas for other alternatives, compatible with their habitat needs after these young forests mature. Losing habitat for some species in the HCAs to provide needed habitat for the northern spotted owl is a tradeoff that is understood and accepted. Timber harvest will not be increased in the Forest Matrix to compensate for the designation of areas managed primarily for owl habitat. The habitat in the intervening lands (Forest Matrix between HCAs) will be managed in accordance with Forest Land and Resource Management Plans and according to the 50-11-40 rule. Such lands will provide habitat conditions favorable for early-successional species.

### Other Wildlife

- **Comment:** The DEIS failed to distinguish between the abundance of wildlife species associated with early-successional forest ecosystems in naturally regenerated stands, as opposed to the abundance of the same species in managed plantations. Also, what will be the rate of fires and trees blown down by high winds in areas where salvage sales will be prohibited.

**Response:** With the standards and guidelines contained in each Forest Land and Resource Management Plan, there should be no difference in the abundance of wildlife species between naturally regenerated stands and managed plantations. However, on many National Forests there will be a difference in the abundance of wildlife species between naturally regenerated stands and managed plantations. The reason for this difference is that although the standards and guidelines require that snags be retained and downed woody material left to benefit wildlife, the number and distribution of snags and downed woody material is typically less in managed plantations than what occurred in the natural stand. Blowdown is a natural occurrence and cannot be accurately predicted.

- **Comment:** The DEIS does not discuss the connection between flying squirrels and mortality associated with the dwarf mistletoe-bark beetle pest complex.

## Appendix L

**Response:** The ISC Report and this EIS recognize the connection between habitat structure and the needs of the northern spotted owl. Prey species of the spotted owl, such as the flying squirrel, are part of the biological richness of the habitats used by northern spotted owls and are dependent on factors such as the dwarf mistletoe-bark beetle pest complex to provide needed structure. Chapter 3&4 of this environmental impact statement discusses habitat structure produced or influenced by pest complexes within a forest environment.

- **Comment:** The entire forest ecosystem needs to survive; the northern spotted owl is an indicator of forest health. The Scientific Panel on Late-Successional Forest Ecosystems gave the ISC Strategy a medium to low rating for providing adequate protection for fish species and old growth, so a plan to protect entire forest ecosystems should be developed.

**Response:** As noted in responses in "The EIS Process" in this appendix, this proposed action is not focused on old-growth ecosystems. This document responds to these concerns in a number of ways. First, by identifying and protecting designated areas from management activities that would alter spotted owl habitat, other species dependent on late-successional and old-growth habitats would also be protected. Secondly, analysis at the Forest level, as part of Forest Plan implementation, will provide site specific assessment and application of Forest Plan standards and guidelines to protect all species in the planning area. A detailed disclosure of impacts to all species inhabiting northern spotted owl habitat is outside the scope of this EIS.

## **Water Quality and Fish Habitat**

### **Sensitive Fish Stock**

- **Comment:** The Forest Service should look at the benefits of salmon protection.

**Response:** Salmonid fishes are one of the forest resources addressed in this EIS under the affected environment and environmental consequences section. This document evaluates a management plan for northern spotted owl habitat. Protection of salmonid fishes is outside the scope of this document.

- **Comment:** Given the scientific papers from the American Fisheries Society in "Fisheries", it's very difficult to believe that fisheries are protected by existing management practices.

**Response:** The detailed analysis needed to fully disclose the impacts to all salmonid stocks within the range of the northern spotted owl is outside the scope of this EIS. Assessment and disclosure of effects from management activities within and outside designated areas will be done on a site-specific basis at the National Forest level through implementation of the selected alternative and Forest Plan standards and guidelines.

- **Comment:** The DEIS, citing the Scientific Panel (Johnson et al. 1991) noted that "Alternatives A and B would have a very-low to low probability of maintaining viable populations of sensitive fish stocks." This statement seemed confusing in light of other statements that best management practices, standards and guidelines, and mitigation measures were assumed to be protective of water quality, riparian areas, and aquatic habitats.

**Response:** The alternatives analyzed by the the Scientific Panel are not identical to Alternatives A and B in this environmental impact statement, and thus the statement in the Draft may overstate the risk. The alternatives analyzed by the Scientific Panel combined Forest Service and Bureau of Land Management managed lands, and estimated the consequences of the management of these lands under each agency's own management direction. As such the statement may well overestimate the threat to sensitive fish stocks from management of National Forests under these alternatives. There is insufficient information in the Scientific Panel's report to extrapolate the viability contribution of National Forest activities.

The information from the Scientific Panel's report was included in this EIS to acknowledge the Panel's view of the potential risk to sensitive fish stocks. It was not intended to be the interdisciplinary team's viability assessment for sensitive fish stocks; a viability analysis was not conducted for any species other than the northern spotted owl.

Until more detailed analysis is conducted (analysis that is outside the scope of this EIS) the general effects predicted in this EIS are accurate. They assume the effectiveness of the Forest Plan management direction in protecting water quality, riparian areas, and aquatic

## Appendix L

habitat. Alternatives B, C, D, and E all disturb less soil and would result in less threat to aquatic resources than Alternative A.

### Water Quality

- **Comment:** The DEIS failed to adequately address adverse effects to water quality and fish habitat due to timber harvest and road construction within the forest. In addition, the Draft failed to address the long-term effects of timber harvest in old-growth forests.

**Response:** The effects on water quality and fisheries habitat was identified where management of spotted owl habitat was estimated to have an effect. It is beyond the scope of this document to address the effects of timber harvesting on water quality, fish habitat, and old-growth forests. These potential effects would be addressed in the Forest Land and Resource Management Plans. The DEIS does display how each alternative would affect acres of existing old growth.

### Watershed Management

- **Comment:** The amount of unlogged watershed that ought to be retained needs to be defined. There needs to be sufficient uncut barriers to assure stream and fisheries protection.

**Response:** This subject is addressed in the standards and guidelines for each individual Forest Land and Resource Management Plan.

- **Comment:** The DEIS does not adequately address the impacts of timber harvesting on watershed degradation, nor the effects of degraded watersheds on spotted owls.

**Response:** The effect of timber harvesting on the watersheds is beyond the scope of this document. All the components of National Forests including watershed conditions were evaluated to determine their ability to provide spotted owl habitat and are reflected in the alternatives as designated areas managed primarily for spotted owl habitat.



## Soils

### Soil Erosion

- **Comment:** The Draft fails to acknowledge that complete watersheds are deteriorating and erosion is increasing.

**Response:** This environmental impact statement addresses how the various alternatives for providing spotted owl habitat affect soil and other resources, rather than addressing the impacts of past or proposed timber harvest practices on the resources mentioned in the comment. Each National Forest is required to prepare a Land and Resource Management Plan which provides overall forest direction and identifies the appropriate standards and guidelines to maintain a quality environment, including the maintenance of high quality watersheds and the prevention of soil erosion.

- **Comment:** The DEIS did not include a discussion on the increase in soil erosion and water quality degradation that can be expected on private lands if harvest levels on private land increase. An increase in harvesting on private land can be expected if harvest levels on National Forests are reduced.

**Response:** The FEIS does address the effect of each alternative on watershed, soil erosion, areas that will be managed for timber production and areas that will be retained for wildlife habitat on lands within the 17 National Forests included in this analysis. It is outside the scope of this analysis to discuss impacts associated with timber harvest on private lands. Timber harvest on private lands within Washington, Oregon and California must comply with regulations established by the Washington Department of Natural Resources, the Oregon State Board of Forestry and State Land Board, and the California Department of Forestry and Fire Protection, respectively.

### Soils and Habitat Management

- **Comment:** The discussion in the DEIS of the environmental consequences on soils is not specific to spotted owl habitat management.

**Response:** The FEIS references the Forest Plan standards and guidelines which ensure that the soil resource is protected. Alternatives B, C, and D result in increasingly less risk to the soil resource because of progressively increasing amounts of designated areas managed primarily for spotted owl habitat. In addition, any ground-disturbing activity proposed in these areas for the benefit of maintaining or creating spotted owl habitat would be analyzed on a project-level basis.

## Land Uses and Permits

- **Comment:** Many small private landowners could potentially be landlocked if their private land is adjacent to National Forest lands which contain spotted owl habitat. The Forest Service could potentially deny issuing a road use permit to the private landowner due to habitat management for spotted owls.

**Response:** This issue is specifically discussed in Appendix H of the Final Environmental Impact Statement.

## Minerals

### Mining - General

- **Comment:** Withdrawal of areas from access to locatable, saleable, and leasable minerals is not appropriate and economic effects of withdrawal should be displayed in the EIS. They are often more valuable than timber and they effect minimal spotted owl habitat.

**Response:** This FEIS does not withdraw, nor propose to withdraw, areas of locatable, saleable, and leasable minerals. In summary locatable minerals will continue to be available but with even more attention to management of surface resources affecting spotted owl habitat. Saleable minerals are sufficiently common or limited as to be generally available outside of designated areas or available without significantly affecting owl habitat. Leasable minerals will be, as they are now, subject to case-by-case decisions considering all environmental factors. In short, designation of areas to be managed primarily for spotted owl habitat will complicate minerals management, potentially eliminating some mining opportunities. Conversely, some owl habitat will be affected by minerals activities. The economic effect could not be predicted.

- **Comment:** Locking up timber ... would deny the miner his right by law, to local timber for mining activities.

**Response:** This EIS does not preclude or withdraw from use the timber on proposed mining projects. Each proposal for mining-related timber use would be analyzed under NEPA on a project-level basis.

- **Comment:** The DEIS fails to adequately address effects on minerals and energy resources and does not specify guidelines about what mining activities may or may not occur in designated areas managed primarily for spotted owl habitat.

**Response:** See comment under "Timber" section of this appendix regarding "the lack of additional measures or management practices". This environmental impact statement displays which types of minerals entries would be likely to occur, along with estimates of the potential number and size of such activities. Management of surface resources on mining claims within the designated areas has always been and will continue to be subject to case-by-case evaluation. The guiding principle will be to avoid detrimental effects to spotted owl habitat wherever possible.

### Open Pit Mining

- **Comment:** The DEIS fails to consider the environmental consequences of open pit mining of porphyry copper in HCAs if such claims exist.

**Response:** The predictions and estimates cited in this EIS point to a presence of three or four porphyry copper deposits within HCAs, with something below that number likely to be commercially developed. Although the opportunities to mitigate the effects of an

## Appendix L

ongoing open pit mine in spotted owl habitat may be limited, the area potentially involved is small compared to the amount of area included in designated areas managed primarily for spotted owl habitat. Proposals will be analyzed in a separate environmental analyses under NEPA (36 CFR 228), with the impacts and mitigation addressed on a site-specific basis, and considered by the Oversight Team. Mitigation might include the addition of other acres to the designated area.

### Access

- **Comment:** The DEIS fails to address the conflict between the consequences of closing or obliterating roads in designated owl habitat versus the need for access to mining projects.

**Response:** The EIS discussion of transportation systems addresses possible reductions in timber-funded roads because of a reduction in timber sale activity. None of the alternatives require the closing of existing roads, nor do they prevent construction of new roads. Any proposal to close or obliterate roads for the purpose of managing for spotted owl habitat would be analyzed in a separate, site-specific project proposal.



## **Recreation**

### **Off-Highway Vehicles**

- **Comment:** Off highway recreational vehicles have no impact on the northern spotted owl, and also contribute to the local economy.

**Response:** The proposed action is not expected to modify the use of off-highway vehicles in the National Forests. Permits of organized events may be modified to protect wildlife and wildlife habitat.

### **Ski Areas**

- **Comment:** Which ski area development or expansions are affected by Alternative B?

**Response:** That information is presented in Chapter 3&4 in the FEIS in the section "Economic Consequences Other than Timber".

### **Primitive Non-Motorized Recreational Opportunities**

- **Comment:** Alternatives B, C, and D will progressively help alleviate the shortage of semi-primitive non-motorized recreation—a shortage so severe that access to some Cascades Wilderness Areas will be rationed beginning in 1992.

**Response:** The text in the FEIS has been changed to reflect the validity of this observation.

- **Comment:** The DEIS's portrayal of recreational impacts is inaccurate. From the onset, non-motorized recreation is cast as being in short supply, and roaded recreation opportunity is viewed as being in surplus which is not substantiated by reliable data.

**Response:** A shortage of opportunity for non-motorized recreation is seen in the State Comprehensive Outdoor Recreation Plan "Recreation Needs Bulletin" for Oregon for 1991. An exhaustive reexamination of recreation planning data and projections is not appropriate for an analysis of effects of this proposed action.

## Transportation

### Road Closures

- **Comment:** What do you mean by not closing roads "if funding is limited"? Doesn't the National Forest Management Act require that unnecessary roads be closed? The DEIS did not disclose what funding limits will prohibit road closures.

**Response:** The Forest Service is required (36 CFR 219.27) to plan and design to reestablish vegetative cover on roadways unless the road is necessary for future resource management activities. The sudden increase in the number of roads needing closure under alternatives designating large areas to be managed primarily for spotted owl habitat, and the sudden exclusion of timber sales and related funding from these areas, could result in a road closing workload in excess of available funding.

- **Comment:** A program of extensive road obliteration should be undertaken.

**Response:** The determination of road needs and treatments are set at the Forest level through the Forest Road Development System Plan, which is beyond the scope of this document.

- **Comment:** The DEIS does not clarify what types of roads would be closed under the different alternatives.

**Response:** The text of the FEIS has been changed in response to this concern.

### Road Costs

- **Comment:** There are Forest Service accounting procedures which are questionable such as unrealistically amortizing logging roads over 240 years when 25 years would be more realistic.

**Response:** The cost of road construction for access for timber production was not part of this analysis. The Forest Service, using standard economic analysis approved by the Government Accounting Office, amortizes investments such as roads over the anticipated life of the improvement. Roads typically have an expected useful life of 20 years.

### Roads and Multiple-Use Management

- **Comment:** The DEIS does not document the positive effects from roads to multiple-use management of the National Forests (e.g., access for firefighting, access for scientists and researchers, and use as a recognizable fireline), specifically if the roads are closed or obliterated because they are within designated areas managed primarily for spotted owl habitat. Any roads that are planned to be closed are subject to the requirements of NEPA and should not be closed as a result of this decision.

**Response:** The FEIS documents the role of the Forest Road Inventory Plan for each forest which establishes short-term and long-term objectives for system roads. The discussion of effects on the transportation system relate to a reduction in timber access roads under alternatives reducing timber production. As the comment notes, the decision to close, obliterate, or add portions of the road system are made in site-specific project proposals with environmental analyses that consider the values cited.

## Economics

### Technological Advances in the Lumber Industry

- **Comment:** Technological improvements have reduced the timber industry work force in the past and will continue into the future. Further advances should be accounted for in future projections.

**Response:** This environmental impact statement recognizes and states that technological improvements have reduced the number of jobs generated per million board feet. Projected future improvements consistent with the 1989 RPA Assessment were factored into the analysis in two forms, 1. a reduction in per unit production costs for final products and 2. changes in the amount of overrun. However, no attempt was made to convert these projected gains in efficiency into a corresponding change in the number of jobs generated per million board feet processed. Such projections would be speculative and beyond the scope of the document. The emphasis is on change in employment and income resulting from changes in future timber supply from the National Forests. Furthermore, any future gains in efficiency would have a similar affect to all alternatives.

### Time Periods Chosen to Display Economic Effects

- **Comment:** A longer time frame should be used to display historic employment to reflect employment prior to SOHAs, the period of high employment over the last 5 years, etc..

**Response:** The display in the FEIS includes the last ten years rather than the last five.

- **Comment:** A longer time period (50 years) should be used to display economic effects.

**Response:** The display in the FEIS includes projections for the next 50 years of domestic lumber production, lumber imports from Canada, final product prices, timber stumpage prices, and timber harvests by ownership. Information in the planning records contains economic information from 1950 to 2040.

### Employment and Income Effects from Other than National Forest Timber Harvests

- **Comment:** Recreation, tourism, fisheries and forest byproduct industries would be enhanced by spotted owl habitat protection and the employment generated by that use should be accounted for as well as timber-related employment.

**Response:** Sufficient data does not exist at this time to quantify the relationship between the level of spotted owl habitat protection and the amount of future recreation use. A narrative statement was added to the FEIS to state that a relationship may exist, but can not be quantified at this time.



- **Comment:** Increases of large areas designated for spotted owl protection will have adverse effects on hunting due to changes in habitat types from early-successional stages which benefit big game species, to late-successional stages which do not provide the same benefits. As huntable wildlife populations decline, so will hunting and all the employment and income generated by hunting.

**Response:** Sufficient data does not exist at this time to quantify the relationship between the level of spotted owl habitat protection and amount of future hunting. This EIS addresses the impacts to early-successional species such as deer and elk. A relationship does exist between levels of animal populations and amounts of hunting, but the exact changes in animal populations and hunting cannot be quantified at this time.

- **Comment:** The designation of spotted owl habitat will have an adverse economic impact by preventing the construction of Early Winters Ski Resort.

**Response:** The potential impact on the construction of the Early Winters Ski Resort is displayed in the EIS in Chapter 3&4 "People and the Forests".

- **Comment:** The preferred alternative will not result in any measurable gains from increased recreation. Consumers have limited discretionary time and money, and increasing tourism, recreation and facilities in one area would likely shift recreational activities from somewhere else.

**Response:** Sufficient data does not exist at this time to quantify the relationship between the level of spotted owl habitat protection and amount of future recreation use. A narrative statement was added to the FEIS to state that a relationship may exist, but it can not be quantified at this time.

- **Comment:** The DEIS presents a vague discussion about the potential restriction on development of winter recreation areas, trailheads, and mining claims. Estimated job impacts are not explained, and their validity can not be ascertained from the incomplete information in the DEIS.

**Response:** These employment estimates were removed from the EIS.

- **Comment:** The display of employment effects should account for timber harvests from lands other than National Forests.

**Response:** Employment generated by timber harvests from other lands is displayed in the Final Environmental Impact Statement in Chapter 3&4 "People and the Forest".

- **Comment:** No mention is made of the potential for a large increase in "recreational dollars" spent in logging communities. With more acreage set aside for spotted owl management, the visual quality of the forests increase, attracting more recreational users.

## Appendix L

**Response:** It is anticipated that recreation use will increase in all alternatives. There is no evidence that setting aside areas for spotted owl management will increase recreation use above any naturally occurring levels. In addition, those people benefiting from increased recreation dollars spent in communities, will not be the same people impacted by reductions in timber harvests. Recreation related employment tends to be seasonal and typically does not pay wages comparable to those in the timber industry. The majority of unemployed timber workers will be unable to be absorbed into recreation or services industries.

## Employment Multipliers

- **Comment:** Pulp and paper industry workers were left out of the employment multipliers.

**Response:** The multipliers were changed to reflect the inclusion of the processing of chips, peeler cores, and other byproducts from plywood and saw mills. This change accounts for an additional 0.3 jobs per million board feet.

- **Comment:** The IMPLAN model was not calibrated to fit actual employment levels in the region, leaving all predictions of future employment in doubt.

**Response:** The multipliers used in the FEIS were changed to reflect actual direct employment in the region. Survey information was used to first determine direct employment. IMPLAN was then used to estimate the indirect and induced multipliers.

- **Comment:** Indirect and induced job loss should be separated out.

**Response:** The description of the direct, indirect, and induced employment effects in Chapter 3&4 of the DEIS was changed in the FEIS to separate out the amount of the total employment multipliers contributed by each category.

- **Comment:** The Forest Service has understated the economic impacts of the ISC Strategy (Beuter 1990). This analysis should be seriously reexamined to determine whether it provides a more realistic estimate of the likely economic impact.

**Response:** The direct, indirect, and induced employment multipliers were updated to reflect the information in Beuter 1990. In addition, this report is narratively quoted in the EIS in the "Social and Community Effects" section of Chapter 3&4.

- **Comment:** The analysis must consider local, regional and state employment effects, particularly with respect to indirect job losses. The DEIS ignores the related loss of stability in ancillary fields and secondary industries. These indirect employment effects should be accounted for as well.

**Response:** The employment multipliers included direct, indirect and induced employment. Of the approximately 15 jobs generated per million board feet, 5 of these are indirect or induced jobs.

## **Distribution of Effects**

- **Comment:** The display of economic effects should more specifically display the spatial distribution of these effects since they are not evenly distributed.

**Response:** The employment effects as displayed by National Forest and are as specific as can be accurately determined. Payments to counties are displayed by county in the Final Environmental Impact Statement. A statement was also added to the FEIS that the majority of the adverse effects will be borne in the states and local areas within the range of the northern spotted owl.

- **Comment:** Social effects should be displayed by community since they are not evenly distributed.

**Response:** Throughout the alternatives, the primary cause of social disruption is changes in employment levels. The employment effects are displayed by National Forest and are as specific as can be accurately determined.

- **Comment:** It is vague to state that social impacts will increase with each alternative without giving any indication of the magnitude of the impacts.

**Response:** As stated in the EIS the primary cause of social impacts is changes in timber employment levels. The employment effects are displayed in the social effects section in Chapter 3&4 of the EIS.

- **Comment:** The Forest Service should display log flow data to show which communities would be most severely impacted by each of the alternatives.

**Response:** Historic log flow data can not be reliably used to predict which communities would have the highest risk of being impacted. As the timber harvest levels decline, the value of logs should increase. As the value of logs increases they are likely to be hauled longer distances thus disrupting historic log flow patterns. Also, during times of declining timber supply it can also be anticipated that some mills will cut back or close down; which mills depends on many factors and can not be predicted. This will also alter log flow patterns, thus making predictions of impacts by community misleading.

- **Comment:** Timber workers who are unemployed due to protection of the spotted owl should be compensated, either financially or otherwise, in return for maintaining habitat for the owl.

## Appendix L

**Response:** Compensation of unemployed timber workers is beyond the scope of this environmental impact statement and not within the authority of the Forest Service.

### Changes in Timber Employment

- **Comment:** Reductions in employment are inevitable since timber harvest levels can not be sustained anyway.

**Response:** All allowable sale quantities (ASQ) established for the National Forests affected by the spotted owl habitat management are based on non-declining even flow, and are equal to or below the long-term sustained yield capacity.

- **Comment:** The Draft EIS states that increased timber production from private lands would be stimulated as Alternatives B, C, and D progressively reduce timber harvests on National Forests. It is unclear whether the induced shifts of employment/income from public land to private land been factored into the employment/income analysis presented in the Draft EIS.

**Response:** As stated in the DEIS, the employment and income estimates were only those generated by National Forest timber harvests. The FEIS has additionally included an estimate of the employment generated from timber harvests from other ownerships. This displays the cumulative employment generated by timber harvests from all ownerships.

- **Comment:** The EIS overstates the reduction in timber employment by drawing comparisons from historic employment rather than the baseline alternative, Alternative A.

**Response:** Alternative A is described in the EIS as the baseline alternative against which comparisons of reduction in employment are made for other alternatives. Comparisons in the EIS are first made with the baseline alternative. However comparisons are also made to the recent historic average since these are real impacts. Both comparisons are presented to illustrate the effects of the alternatives.

### Multi-Resource Strategy

- **Comment:** The economic and social effects of the Multi-Resource Strategy should be displayed in a manner similar to the other alternatives.

**Response:** The effects of the Multi-Resource Strategy are displayed in the FEIS as Alternative E.

### Timber Market Effects

- **Comment:** The environmental impact statement should display the degree of risk for timber supply and employment associated with the alternatives.



**Response:** Changes in timber supply and employment associated with the alternatives are displayed in Chapter 3&4 under "People and the Forests".

- **Comment:** The effects on timber markets are exaggerated since the no-action alternative assumes SOHAs are the management regime and this regime produces a higher ASQ than the approved Forest Plans.

**Response:** The effects are not exaggerated since SOHAs are the spotted owl management regime used in the existing Forest Plans in Oregon and Washington.

- **Comment:** The DEIS assumes that the last 5 years are an accurate reflection of future demand for timber.

**Response:** Future estimated demand for timber is not based on the last 5 years. Rather, demand is based on factors as population, demographics, price, and income.

- **Comment:** The DEIS states that Canadian imports in the short run will fill in for reductions in domestic timber harvests. However the graph showing Canadian imports in the document shows a decline in all alternatives through the year 2000.

**Response:** The graph shows higher Canadian imports for those alternatives with lower timber harvests. Domestic production and imports both decline slightly over the next decade because of a decline in the U.S. population entering the prime home buying age during that period. The "baby boomers" are passing prime home buying age in the 1990's. Demand for housing picks up after the 1990's because their offspring start entering the prime home buying age.

The discussion in the EIS also stresses that less attention should be paid to the absolute amounts in all of the projections, and more attention paid to the relative differences between them. That is why all comparisons are made to the baseline alternative, Alternative A.

- **Comment:** The FEIS should discuss how each alternative would affect the lumber export market and whether any employment/income shifts could occur as a result of export market changes.

**Response:** The impacts on U.S. exports of lumber will not vary significantly between the alternatives. Projected lumber exports vary less than 1 percent between the alternatives.

- **Comment:** The Forest Service failed to assess the economic impact to all parties affected such as the results of increased prices on other timber landowners and the effects on consumers.

## Appendix L

**Response:** The DEIS and FEIS display how landowners will respond to increased timber prices in Chapter 3&4 under "People and the Forests". In addition, the FEIS displays what their contribution to employment was in the past and will be in the future.

Affects on consumers are also displayed in the DEIS and FEIS in terms of changes in total U.S consumption and prices of lumber, plywood, and oriented strand board. The FEIS also contains a description of the impacts of changes in housing prices faced by consumers.

- **Comment:** The DEIS states that forest industry harvests will be higher in the short term, yet the graph indicates that forest industry harvest for all alternatives will be sharply down until the year 2005.

**Response:** The graph shows higher short-term harvest of forest industry timber for those alternatives with lower National Forest timber harvests. Reductions in Forest Service timber harvests will increase stumpage prices. In response to these increased stumpage prices, forest industries will increase their rate of harvest, yet will be unable to sustain the higher levels.

Forest industry harvests in all alternatives decline over the next decade because of a decline in the U.S. population entering the prime home buying age during that period.

The discussion in the EIS also stresses that less attention should be paid to the absolute amounts in all of the projections, and more attention paid to the relative differences between them. That is why all comparisons are made to the baseline alternative, Alternative A.

- **Comment:** The increased imports of Canadian lumber will further increase the existing balance of trade problem.

**Response:** Increased imports of Canadian lumber may increase the balance of trade deficit however this is outside the scope of this document.

- **Comment:** Increases predicted in timber stumpage for some alternatives may be overestimated as a result of not accounting for competition from Canada and the South.

**Response:** Competition from other economic regions was accounted for in the economic analysis. Changes in timber harvest levels from the National Forests in the alternatives will only moderately affect national prices for softwood lumber and plywood. National and international competition in final product markets should be sufficient to prevent large increases in national prices for manufactured wood products. On a regional level however, the reductions in available timber supply will have a more pronounced impact on local harvest values due to a smaller market size. Typically, unprocessed logs are not transported nearly as far as finished products, thus they have a more limited market size.

- **Comment:** The stumpage prices in California in the DEIS indicate price increases ranging from 2.5 to 3.5 times the historical level.

**Response:** The recent stumpage prices in California have been abnormally low due to the large amount of salvage volume recently on the market major as a result of fires and drought-killed trees. A preponderance of the projected increase in stumpage prices represents a return to normal conditions rather than a true increase. The EIS states that more attention should be given to the differences between the alternatives than on the actual projections.

- **Comment:** Pending legislation and or ballot initiatives in California will not allow the increase in harvests in the short term from private industry lands as accounted for in the EIS. This should be accounted for in the EIS.

**Response:** State regulations in California may well reduce possible harvests from private lands, which would further increase the reliance on imported wood products from other states and foreign countries. The exact amount of any possible reduction in private harvests cannot be determined at this time.

- **Comment:** How can stumpage prices increase dramatically with no change in national final product prices? If the businesses along the west coast can not pass those increases in cost along to consumers, many will have to close.

**Response:** Changes in timber harvest levels from the National Forests under these alternatives would only moderately affect national prices for softwood lumber and plywood. National and international competition in final product markets should be sufficient to prevent large increases in national prices for manufactured wood products. On a regional level however, the reductions in available timber supply will have a more pronounced impact on local harvest values due to a smaller market size. Typically, unprocessed logs are not transported nearly as far as finished products, thus they have a more limited market size. It is anticipated that the structure of the wood products industry on the west coast will continue to change, including the closing of less efficient firms.

- **Comment:** The current recession in the housing market should be reflected in the demand for wood products.

**Response:** The current recession was accounted for in the Timber Assessment Market Model (TAMM) which was used to estimate the impacts on the timber markets. The change in demand was accounted for in the model by altering the housing-start assumptions.

- **Comment:** There is a large potential error in the market projections.

**Response:** The market projections are not intended to represent precise predictions of what actual timber prices, import levels, or consumption would actually be at any given point in the future. Instead, the projections should be used as an estimate of the direction and magnitude of changes. Although actual events in the future may not exactly

## Appendix L

correspond to the projections, the relative difference between alternatives is still useful and valid.

- **Comment:** The assumption that demand for wood products will remain constant is faulty; it will actually fluctuate greatly.

**Response:** The market projections are not intended to represent a constant demand for wood products. The forest products industry, like all others, is subject to cycles of up and down markets. This EIS disclaims that actual timber prices, import levels, or consumption will precisely match the projections at any one point in the future. Instead the projections should be used as an estimate of the average annual amount and should be used only to assess the direction and magnitude of changes.

## Social Cost of Unemployment

- **Comment:** Unemployment carries a high cost to state and local governments in addition to the loss of income suffered by members of the community. Increased social costs of unemployment include increased demand for public funds as a result of, additional case loads for the sheriff's department, jails, mental health departments, and substance abuse departments.

**Response:** Although counties may face an increased burden due to additional unemployment, the exact cost is difficult to quantify. The FEIS addresses the fact that such costs may exist. See the social and community effects section in the EIS as well as the economic section of Chapter 3&4.

- **Comment:** Unemployment associated with declines in timber harvest levels also creates the loss of corporate and individual income taxes, yield taxes, and sales taxes.

**Response:** State and local governments may face additional revenue losses due to reduced tax revenues. The FEIS recognizes that such costs may exist, and that they change in proportion to the income effects that are displayed in the Employment and Income section of Chapter 3&4.

- **Comment:** The cost of mitigation of adverse social effects should be factored into the cost of spotted owl preservation.

**Response:** It is not possible at this time to accurately estimate the mitigation cost of the social effects. These possible effects and their potential risk of occurrence are displayed in the FEIS.

- **Comment:** Property values can be expected to decline with declining timber harvest levels and this will impact county finances.



**Response:** Declines in timber harvests may lead to declines in property values in some communities. Although the exact amount is difficult to quantify, the FEIS recognizes that such costs may exist, and assesses the potential risk of lost property tax revenues between the alternatives. Reductions in property taxes are only expected in areas where declines in timber-related employment and income are greater than increases in other sectors of the economy.

## **Log Exports**

- **Comment:** The job losses were calculated without taking into consideration the future ban of log exports. This is a key issue that needs to be addressed.

**Response:** No additional restrictions on log exports were incorporated into the analysis. Price increases were assumed to have resulted in the loss of the Chinese and Korean export markets (two thirds of the total).

Additional restrictions to the log export policy may increase the volume of timber that is processed in domestic markets, creating additional employment in the continental United States. This, and many other factors may affect the timber and wood products industries in years to come, apart from, or in addition to, the impacts related to the management of spotted owl habitat. Because of these compounding influences and uncertainties, the EIS has not attempted to predict employment levels past 1995. In addition, the relative difference between the alternatives are approximately the same regardless of the influences from other factors.

- **Comment:** We would rather see restrictions on timber exports to have more of our timber processed in the United States and thus protect domestic jobs.

**Response:** Additional restrictions on exports of wood products are beyond the scope of this environmental impact statement.

- **Comment:** the Department of Agriculture and Forest Service have a mission to improve the employment opportunities, incomes, and well being of the Nation's rural people by strengthening the capacity of rural America to compete in the global economy. Export restrictions are the best way to do this.

**Response:** Additional restrictions on exports of wood products are beyond the scope of this environmental impact statement.

- **Comment:** The economic analysis is incomplete and overstates job impacts because no assessment of the beneficial effects of the 1990 log export law for the State of Washington was included.

**Response:** The ban of State owned logs in Washington was included in this analysis. The display of employment created by timber harvests on all ownerships was included in the FEIS.

## Appendix L

- **Comment:** Log exports are mentioned as a means to mitigate the effects of spotted owl habitat protection. These restrictions may not have the desired effect.

**Response:** It is acknowledged in the FEIS that a ban on log exports may not directly cause a corresponding increase in volume to be processed domestically. The impact of such a ban would vary depending on the situation faced by each landowner. Some landowners may decide to process that volume through their own mill rather than making the volume available to other domestic processors. If these mills are already operating at capacity the result would be no net increase in domestic production. Similarly, some landowners may simply choose not to harvest their volume rather than receive lower returns. Finally, a ban on log exports is not within the jurisdiction of the Forest Service.

## Economic Value of Non-Timber Resources

- **Comment:** The DEIS fails to aggregate the average person's willingness to pay for the spotted owl.

**Response:** The FEIS will display an aggregation of values Nationwide.

- **Comment:** Why does the document state the two studies on existence values of spotted owls habitat protection (Hagen et al. 1991 and Rubin et al. 1991) still have some methodological problems therefore their results remain unsettled?

**Response:** The statement has been removed and the results of these theoretical studies are shown in the FEIS.

- **Comment:** The studies cited to demonstrate willingness to pay values for spotted owls habitat protection (Hagen et al. 1991 and Rubin et al. 1991) are inadequate to demonstrate this point. The studies contain untested assumptions.

**Response:** The studies cited are theoretical, but they are published and have been subject to peer review. The practical test of the Nation's willingness to pay for spotted owl habitat protection will be determined through the legislation and policies directing the management of this habitat.

- **Comment:** In regards to the existence values, if people are willing to pay these, that amount should be made available by profits from timber now.

**Response:** The existence values are theoretical amounts people would on the average be willing to pay to preserve the spotted owl. They do not convey any further information.

- **Comment:** The DEIS states that, "There are no forest activities with significant social and economic implications whose level of activity would vary inversely with timber harvest." Many people feel that forest economics revolve around timber and the spotted owl, with no idea of how valuable fish might be.

**Response:** The text has been changed in the FEIS. The effects are addressed in qualitative terms in the fisheries and non-market contribution sections of the EIS.

- **Comment:** Recreation, tourism, fisheries, water quality, air quality, cultural resource, and forest byproduct industries would be enhanced by spotted owl habitat protection and should be accounted for as a possible economic gain associated with the preservation of the owl.

**Response:** These effects are discussed narratively in the EIS. However, sufficient data does not exist at this time to quantify the relationship between the level of spotted owl habitat protection and the amount of economic benefits associated with these resources. The narratives in the EIS state that a relationship may exist, but cannot be quantified at this time.

- **Comment:** Factors such as other species (elk, deer, and Pacific yew), watershed enhancement, and air and water quality will be affected and should be included in the economic analysis.

**Response:** The effects on these resources is discussed in the EIS. However, given the scope of this EIS it is not possible to quantify the relationship between the level of spotted owl habitat protection and the amount of production of these resources or their economic values.

## **Revenues/Returns to Counties**

- **Comment:** To properly assess the impact of reductions in the returns to counties, these returns should be displayed on a county-by-county basis.

**Response:** The returns to counties are displayed by county in the Final Environmental Impact Statement.

- **Comment:** Where do the "revenue" figures in the Summary come from?

**Response:** The revenue figures are the gross receipts from timber harvests from the 17 National Forests included in this analysis. The figures were estimated by multiplying future harvest levels by stumpage prices adjusted for any anticipated increase in price. A more complete discussion of these figures is contained in the document.

- **Comment:** I feel the revenue figures cannot be sustained into the future; the future figures should be displayed.

**Response:** The timber harvest levels associated with all alternatives can be sustained in perpetuity. In all alternatives, prices for wood products are anticipated to increase in future decades. Therefore, although there may be yearly fluctuations, on the average, revenues should be stable or increasing in the future.

## Appendix L

- **Comment:** Displaying gross revenues to the Federal Treasury is misleading since it ignores the expenditures necessary to produce such revenues.

**Response:** The FEIS displays net revenues after expenditures as well as gross revenues.

- **Comment:** Rather than comparing changes in revenues to the average of the last 5 years and the Alternative A baseline, figures should be compared to the last 100-year average.

**Response:** Standard economic analysis uses what is called the "with and without" analytical technique. This calls for establishing a baseline (Alternative A) of what would happen if no changes were made, and then comparing this with what would occur if a different alternative were to be implemented. In this fashion the marginal impacts of the proposed action are displayed. The comparison to the 5 year average was added to the analysis in order to display the change from the most recent levels actually experienced by people. A comparison to the average over the last 100 years would not add any meaningful new information.

- **Comment:** The 25 percent payments to counties should not be dependent on the fluctuating timber market. There should be a standard, set amount received by these counties.

**Response:** It is not within the jurisdiction of the Forest Service to change the formula for payments to counties. Such a change would require additional legislation.

- **Comment:** The revenue figures are shown in gross amounts, not in net returns. I understand that the Forest Service operates with a huge deficit and that most timber sales are below cost.

**Response:** The revenue figures displayed are in gross amounts. None of the 17 National Forests included in the analysis are below-cost Forests under the accounting criteria used by the Forest Service and approved by the U.S. General Accounting Office.

## Wood Product Prices

- **Comment:** Increased lumber prices will impact the number of people who can afford to buy a house. The number of people no longer able to buy a house should be displayed on a state-by-state basis.

**Response:** The cost of lumber and wood products averages between 3 and 7 percent of the total cost of a house. This environmental impact statement states that the cost of finished wood product prices will increase at the most 9 percent in any alternative. For a \$100,000 home, this equates to an additional \$270 to \$630 added on to the total price.



## **Economic Efficiency Measures**

- **Comment:** The environmental impact statement should contain a display of the economic efficiency of each of the alternatives.

**Response:** The FEIS contains a ranking of the Alternatives by their implied present net value.

Economic efficiency measures, such as present net value (PNV), internal rate of return (IRR), and benefit/cost ratios, are examples of economic efficiency measures that could be used to evaluate the alternatives. All these measures involve calculating the value of outputs that can be both quantified and valued, and comparing them with the forest management costs. However, most of the outputs associated with the alternatives, other than timber, cannot be both quantified and valued at this time.

Present net value is the criteria used by the 17 National Forests to evaluate economic efficiency. Since none of the Forests included in this analysis have a below-cost timber program, and maximum PNV was the final objective used in establishing timber harvest levels, it can be assumed that PNV will vary in a direct relationship with the timber harvest level of each alternative. This assumption is borne out by the display in the FEIS which illustrates that "net revenues" from the timber program are all positive and vary in a direct relationship with timber harvest levels.

The CEQ's regulations for complying with NEPA (40 CFR 1502.23) indicate: "For the purposes of complying with the Act, the weighing of merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations."

- **Comment:** The document states that the no-action alternative will be the most economically efficient, but presents no evidence in defense of this assertion.

**Response:** The FEIS contains a presentation of the net timber revenues associated with each alternative. This table indicates that net timber revenue varies directly with timber harvest levels. At this time most of the outputs associated with the alternatives, other than timber, can-not be both quantified and valued. The discussion of economic efficiency measures in the FEIS has been changed to use this evidence to support the PNV ranking of the alternatives.

## **Economic Diversification**

- **Comment:** The Forest Service should focus on helping timber communities diversify and strengthen their economies, improve local services and enhance the quality of life.

**Response:** The Forest Service has programs to help strengthen and diversify local communities. These include the Rural Development Program and the Pacific Northwest Strategy.

## Appendix L

- **Comment:** The Northwest is an area of high economic growth. Changes in employment, particularly for those jobs that IMPLAN categorizes as indirect and induced, should be considered in light of growth in the regional economy.

**Response:** The EIS describes the past economic growth of the region. Any future economic growth not associated with the timber industry would apply similarly to all alternatives and does not change the relative difference between alternatives.

## Communities

### Social and Cultural Effects

- **Comment:** There was little or no consideration of impacts on community and economic stability, and on the social impacts of the alternatives.

**Response:** These comments were apparently based on the Summary of the DEIS, and not on the DEIS itself, which did present the social and community cultural effects of the alternatives in Chapter 3&4, "Social and Community Effects". These effects are summarized in the FEIS Summary.

- **Comment:** Social and local government impacts are reported in "Social Impacts of Alternative Timber Harvest Reductions on Federal Lands in O and C Counties".

**Response:** The effects noted in this report are not inconsistent with those reported in the DEIS. The interdisciplinary team has reviewed the report and included relevant information in the FEIS.

- **Comment:** The Forest Service must analyze social impacts at a community level and quantify those impacts.

**Response:** The interdisciplinary team believes it is impossible to evaluate the social effects of these alternatives at a local level or to quantify the effects. To do so would be inaccurate and misleading. (See Chapter 3&4, "Counties as Units of Analysis" in "People and the Forests".) However, the FEIS does present projected payments to counties as county-specific information.

- **Comment:** Because of the mandate of the 1897 Organic Act, community stability must be evaluated on a local level.

**Response:** The Act does not require the assessment of community stability at the local level.

- **Comment:** Social effects involving "loss of trust in federally assured timber supplies" is not based on a legal basis for that trust, and "open conflict over cultural values" is not an adverse impact.

**Response:** The text in the FEIS has been changed to more fully explain the context of these observations.

- **Comment:** "There are no forest activities with significant social and economic implications whose level of activity would vary inversely with timber harvest." This

## Appendix L

statement in the DEIS failed to consider the reduced impact to archaeological and American Indian religious sites and visual quality. It also seems likely that recreation would increase in preserved old-growth forests.

**Response:** The text in the FEIS has been changed to correct the unintentional minimizing of the significance of preserving sites and scenery. However, the hope that growth in recreational activities will compensate for the impacts to the timber-dependent communities is not well founded. Some specific communities may adapt with that change, but most communities will be subject to the predicted impacts.

- **Comment:** "There are no forest activities with significant social and economic implications whose level of activity would vary inversely with timber harvest." What about fisheries?

**Response:** The extent and nature of fisheries that would improve from reduced timber harvest is not easily established. However, it is likely that the improvement would not provide an immediate or fully compatible substitute for all timber-dependent communities and families.

## Civil Rights Impacts

- **Comment:** The Forest Service's "own rules require and regulations require it to examine the civil rights impacts of proposed actions which will affect 10 or more people inside or outside the agency".

**Response:** The direction in Forest Service Handbook 1709.11, Chapter 31.1, Exhibit 1 and 31.11 states: "A civil rights impact analysis for environmental or natural resource actions is part of the social impact analysis package in a necessary environmental impact statement." The civil rights impact analysis is presented in the DEIS and the FEIS as part of "Social and Community Effects" in Chapter 3&4. Additional information is in "Minorities and Women" in that chapter.

"Civil rights" is defined as "The legal rights of United States citizens to guaranteed equal protection under the law." (Forest Service Manual 1705). Because no actual or projected violation of legal rights of equal protection is foreseen, no civil rights impacts are reported in the FEIS or DEIS.



## Comments and Concerns

### "Direct Quotes"

People have very different views on how National Forests should be managed. Some feel all of it should be preserved, some feel it should be harvested and replanted, and some fall in between. People also have many different concerns about the effects an environmental impact statement for the management of habitat for the northern spotted owl will have on their lives and future generations. Some fear a change in their livelihood and community, some fear an irreversible change in the environment.

Many people wrote or spoke to express their fears, frustrations, or preference for an alternative. Because of the genuine and heartfelt emotions expressed in many of the letters and testimonies, we felt it important to portray them in this document. Following are excerpts from some of those comments.

"Because of no timber supply because of owl, I have lost my job along with 400 other mill workers and 150 contract loggers here in Glendale, Oregon. Is the owl worth the loss of human life and suffering we are going through. You have given in to the environmental group that is destroying the northwest and I know you won't read this because you only listen to the environmental evangelist and you have a paycheck coming in no matter what."

"I disagree with those who believe we can continue "business as usual". We can't expect the forests and their inhabitants owe *us* a living."

"I am not employed in the timber industry. The schemes so far presented are not at all practical. The economic effects on the community are far too drastic."

"I know that removing these lands from potential timber harvesting will cause some economic difficulties. However, I think we must begin to address our dependence on timber in new and innovative ways, so that we can pay more attention, not less, to the environmental needs of the earth."

"Clearly the endangered species act has our basic rights in jeopardy."

"America and the world need wood. All the restrictions on timber harvesting are eliminating productive and valuable jobs. The social and economic factors should be considered."

"I am concerned that the decisions made on the northern spotted owl issue will damage the economy of the whole northwest and also set future policy on all the national forests."

"My family is not directly supported by timber dollars, though I live in a community that is. I fear for the effects on our community. I also feel we need to support the working man in this country above the needs of animals."

"If the "cut and run" tactics of our nation's logging industry are not reigned in now dozens of species could realize extinction. I recommend you heavily restrict logging and preserve jobs for our future generations."

"We need whole forests, not museum species artificially maintained. Please preserve whole forests for the next generation."

"Utilization of our forests needs to take place to keep forests coming for our next generation."

"The economic and social foundation of the Pacific Northwest is on the verge of collapse. Let's not lose 30,000+ jobs to the owl. We have national parks and wilderness areas enough to protect the owl."

"I believe that the preservation of the spotted owl must take precedence over all other considerations. If this means job losses - so be it. And I work for a timber company."

"What happens to you people in the west will happen to us in the east. So all of us who work in the woods are very concerned about your fight."

"No country is so rich it can afford to lock up its natural resources. The basis of all wealth. Especially true of renewable resources."

"I've made numerous calls - written letters - participated in rallies and protests trying to get someone's attention. It seems no one listens - no one cares - We're here for equity - We want to be environmentally conscious but we also want to work - Doesn't anyone hear us? - Isn't anyone listening?"

"As an owner of a small business in a very timber dependant community, I risk loosing more than just *my job, my roots, and my community*. I ask you once again to please consider me."

"Why should hard working people have to endure such suffering and hardships by losing their job, and homes, self-respect. Most of these people don't know any other way of making a living."

"Our household buys recycled paper products. Our country can support markets of these products and prevent the ridiculous waste of wood products at building sites, and prevent exports of logs to be processed abroad. We can protect our forests *and* create jobs. Please support Alternative D."

"I think you folks are completely off-based if you continue to put people out of work in a time when our nation faces economic chaos. Science has shown the owls can survive in second growth as long as it displays old-growth characteristics. Please implement a plan that will allow the continuance of Oregon being the nation's #5 supplier of wood products."

"Need to come up with a plan that can help not only the spotted owl, but also my Father, Mother, Aunts, Uncles, and Cousins."

"I believe in ecology, but I also believe in survival of people too."

"It physically sickens me to even think of the imminent danger to my family, friends, and the people as a whole because of a bird... There has to be an answer to this problem without people losing jobs, homes, even their very lives due to this depression. People have already committed suicide in *our* community."

"Decisions on how to manage the spotted owl should be made by the Forest Service. Not by judges and Environmental groups."

"Which is more important, people or a bird? Is the welfare of a family less important than a bird? Why is there more money spent on a bird than a needy family?"

"Please adopt Alternative D which will save/protect all of the forest species, as well as the spotted owl."

"Don't take my grandpa's job away. I think he's just as important as the spotted owl. I don't like to see him cry."

"Our rural social fabric is being ripped apart with unemployment, welfare, abuse and crime, panic and depression. We need Alternative A."

"I think there should be some kind of legislation restricting lawsuits by Environmental groups and the legal system is being misused."

"How can you throw away the lives of whole towns and families without a glimmer of remorse. Do you have children? What would you tell them if you were suddenly faced with the prospect of welfare lines and not enough food on the table?"

"We should not let the short-term benefits of continued logging of old-growth blind us to other, longer term benefits that we might derive from protection of what's left. The current excitement over the Pacific Yew is a good example of such a benefit. If we continue to liquidate the old-growth of the PNW, we may lose species that would provide us with future economic and medical benefits"

Views expressed by the respondents cover a wide range of topics. Much of the subject matter is beyond the scope of this environmental impact statement and the authority of the Forest Service, while many of the issues are discussed in the FEIS Chapters and Response to Public Comments. However, the interdisciplinary team hopes that by displaying these concerns readers are assisted in understanding the many differing points of view.





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Appendix L-B

**Federal and State Agency Letters**





United States  
Department of  
Agriculture

Soil  
Conservation  
Service

West National Technical Center  
511 NW Broadway, Room 248  
Portland, Oregon 97209-3489

October 22, 1991

Jerald N. Hutchins, Team Leader  
Northern Spotted Owl EIS Team  
P.O. Box 3623  
Portland, OR 97208-3623

Dear Mr. Hutchins,

Thank you for the opportunity to review the Draft Environmental Impact Statement on Management for the Northern Spotted Owl in the National Forests (DEIS). The DEIS has been identified as "Environmental Document No. 1046" within the Soil Conservation Service (SCS).

The SCS conducts landowner assistance, watershed management and soil survey programs on private forest lands to assure that forestry activities do not degrade soil, water, animal, plant and air resources below tolerable levels. The SCS works closely with local conservation districts and state forestry agencies to accomplish these programs.

We are concerned with the impact that DEIS management alternatives will have on the harvest levels of private forests. Decreased harvesting on National Forests (Table 3&4 - 20, page 3&4-84) will shift the demand and harvest of wood to private sources (Figure 3&4 - 21 and 22, page 3&4-139). Based on our experience, a commensurate increase in soil erosion, water quality degradation and wildlife habitat disturbance can then be expected on private forest lands. However, we could not find a discussion of these impacts on private lands in the DEIS.

The Soil Conservation Service  
is an agency of the  
United States Department of Agriculture



Jerald N. Hutchins  
10/22/91

Page 2

We recommend that narratives on wildlife (3&4-102), water quality and fish habitat (3&4-116), and soils (3&4-120) be expanded to include the "shifted" impacts on private lands. In turn, a discussion of program impact on the SCS would be needed in Appendix C.

Sincerely,

  
STANLEY N. HOBSON  
Director

cc:  
Clarence M. Maesner, Head, ESP, WNTC, SCS, Portland, OR  
Jack R. Carlson, Head, ECS Section, WNTC, SCS, Portland, OR  
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Department of Energy  
Bonneville Power Administration  
P.O. Box 3623  
Portland, Oregon 97208-3621

IN REPLY REFER TO

EPBC

Mr. Jerald N. Hutchins, Team Leader  
Northern Spotted Owl EIS Team  
P.O. Box 3623  
Portland, OR 97208-3623

Subject: Comments on Draft Environmental Impact Statement on Management for  
The Northern Spotted Owl in The National Forests

Dear Mr. Hutchins:

The Bonneville Power Administration (BPA) has reviewed the Forest Service's Draft Environmental Impact Statement on Management of The Northern Spotted Owl (DEIS) issued in September, 1991. As a Federal power marketing agency, BPA owns, operates, maintains, and constructs transmission facilities, many of which are located on Forest Service lands and within the proposed spotted owl critical habitat units and habitat conservation areas. The new proposals for management of Forest Service lands may result in impacts on our ability to serve regional transmission needs. Our comments address two different areas: operations and maintenance on existing facilities and the construction of new facilities, both adjacent to existing lines or in new corridors. Specific comments on these transmission system impacts follow.

#### Existing Facilities

A list of BPA's existing transmission facilities that cross or are located within Forest Service lands is enclosed (Table 1), along with a map showing the locations of these facilities (Figure 1). The table shows, by Forest, the facility by name, the voltage of the transmission lines, the critical habitat units crossed, and the length of right-of-way within the critical habitat units. BPA-owned transmission line rights-of-way, as well as critical habitat units, communication facilities, are located in proposed critical habitat units on National Forest lands. Essential access roads associated with maintaining these facilities also cross habitat areas outside of our rights-of-way.

We are concerned that changes in management of these rights-of-way resulting from the implementation of the Forest Service management plan could affect BPA's ability to operate and maintain the Pacific Northwest transmission system. For example, the removal of danger trees (trees which grow tall enough to fall into the transmission lines) is essential to continued reliable service. If the management plan precludes this practice, the possibility of a major outage and possible forest fire resulting from a tree falling into

conductors would increase dramatically. We have experienced such problems where we did not clear enough trees on our 500-kV Colstrip transmission line in northwest Montana and northern Idaho.

BPA and other Northwest utilities are currently consulting informally with the U.S. Fish and Wildlife Service (USFWS) on the issue of whether operation and maintenance activities on existing facilities will adversely affect the spotted owl. BPA will keep the Forest Service informed of the progress of this consultation.

#### Construction of Future Facilities

The Federal Land Policy and Management Act (FLPMA) and the National Forest Management Act (NFMA) authorize the Forest Service to designate utility corridors. Designation is made by incorporating corridors as land uses in federal land and resource management plans and associated documents prepared in accordance with the National Environmental Policy Act (NEPA).

Several studies have identified transmission and other utility corridors (often containing multiple transmission lines) across the Cascade. The first such study was a joint study by BPA and the Forest Service, published in 1977 as the "Pacific Northwest Long Range East-West Energy Corridor Study." This study identified seventeen utility corridors across the Cascade Mountains in both Washington and Oregon, as well as Rocky Mountain corridors. Some of the corridors contained existing transmission lines, roads, and other utilities, while other currently unoccupied corridors were identified for future needs. The Northern Cascade Corridor Availability Study, prepared by BPA in cooperation with BLM and the Forest Service. The corridors identified in these two reports are listed in Table 2. In addition to these studies, the Western Utility Group prepared a 1980 Western Regional Corridor study which identified some additional corridors. This study was updated in 1986 and is again being updated to include oil, gas, and electric utility corridors.

The Forest Service has designated many of these corridors in their land and resource management plans:

- (a) In Washington, four utility corridors were identified and discussed in the 1990 Mt. Baker-Snoqualmie National Forest Land and Resource Management Plan. The major corridor identified in the plan follows the Green River, crossing the Cascade Mountains at Stampede Pass. The other three corridors described in the Forest Plan are located along the Skagit River, through Stevens Pass, and across Snoqualmie Pass. A total of 30.5 miles of utility corridor is located on Mt. Baker-Snoqualmie National Forest lands.



(b) In Oregon, BPA operates transmission lines on the Mt. Hood and the Willamette National Forests. Other utilities own and operate transmission lines on the Umpqua, Rogue River, and Winema National Forests. These corridors are recognized in the respective forest planning documents.

It appears that most of these corridors will be impacted by the management plan and the proposed spotted owl critical habitat units. Figures 2 and 3 illustrate that between existing exclusion areas such as wilderness and National Parks, and the critical habitat areas proposed by the USFWS, there is almost a solid barrier to cross-Cascade transmission lines in Washington and Oregon. This is of great concern, especially since most of the power for the large population centers in western Oregon and Washington must be transmitted over the Cascades from the generation in the east.

While we support the concept of using existing corridors wherever possible, and FLPMA encourages this, the existing corridors across the Cascades are becoming quite congested. Transmission corridors, both new and existing, are a finite resource due to a combination of geographic, statutory land use, visual, and other constraints. These corridors are resources which should be preserved. A concern with concentrating all of the cross-Cascades transmission in two or three major corridors is the possibility of simultaneous outages of several transmission lines, which can result in region-wide catastrophic outages. Concentration may not even be possible in some places because of constraints which narrow some of the corridors.

BPA is actively participating in the USFWS public process for designating spotted owl critical habitat. Recently, we have completed spotted owl consultation with USFWS for the construction of the Eugene-Medford Transmission Line Project which crosses spotted owl habitat on Bureau of Land Management lands. This consultation resulted in a USFWS biological opinion finding no jeopardy to the spotted owl. The biological opinion contained terms and conditions acceptable to BPA.

BPA would like to have the assurance that the Forest Service will not consider the proposed management plan to force close operations and maintenance activities on existing facilities or construction of new facilities which may be proposed in the future. We agree with the Forest Service that construction of new facilities must be reviewed on a case-by-case basis. Where impact to habitat or spotted owls appears to exist, we would enter into formal consultation on these new facilities to identify the extent of the impact and appropriate mitigation. Our recent experience on the Eugene-Medford Transmission Line Project indicates that new facilities would not necessarily result in jeopardy to the owl.

We appreciate the opportunity to make these comments. If you have any questions or need further site-specific information, please contact Nancy Weintraub at (503) 230-5511.

Sincerely,

*Nancy H. Weintraub*

for Clifford C. Perigo  
Deputy Assistant Administrator  
for Engineering

Enclosures

Table 1: Bonneville Power Administration Facilities Within Forest Service Lands				
OREGON	FACILITY NAME	VOLTAGE(kV)	C. H. UNIT	LENGTH OF R.O.W. IN C.H. UNIT (MILES)
NATIONAL FOREST Mt. Hood	Cascade Locks SS			
	John Day-Keeler	230		
	Big Eddy-Trousdale	287		
	Big Eddy-Orion City	287		
	Big Eddy-Keeler No. 1	345		
	Big Eddy-Sandy No. 1	345	MH-2	3.4
	Pebble Springs-Menon 1	500		
	Pebble Springs-Menon 2	500		
	John Day-Marcola 1	500		
	Bonneville-The Dalles	115	O-1	16.1
	So. Bank Substation			
	Action Substation	500		
	Hanford-Ostrander	115	O-5	14.2
	Maupin-Detroit 1	500		
	Maupin-Detroit 2	500		
	McNary-Sentiam	287		
	Hell Ridge MW			
	Detroit SS			
	Tumble Creek SS			
	Blue River Tap			
Willamette	Cougar SS	115		
	Cougar Station S 1	115	O-5	14.2
	Maupin-Detroit 1	500		
	Maupin-Detroit 2	500		
	McNary-Sentiam	287		
	Wolf Mtn. Mizrowave		O-10	
	Oakridge Lookout Pt.		O-11	7.1
	Mt. Hebo			
	Salem-Tillamook	115		
	Alvey-Tahkenitch	230	CG-1	4.2
Suslaw	Eugene Mapleton	115		
	Goodwin Peak Micro.		O-31	
	Mapleton-Rainforest	115		
	Alvey-Tahkenitch	230		2
	Mary's Peak JWH/VHF		O-39	
	Toledo-Windson	230	O-34	3.3
	Toledo-Windson	230	SNF-1	11.6
	Applegate BV MW			
	Swan Lake PT MW			
Unquaga Wheema	Redmond-Klamath Falls	230		
	Pine Mtn. MW			
	Sand Springs Comp.			
	LaPine SS			
	Odell BV MW	230		
	Redmond-Klamath Falls	115		
	LaPine-Fl. Rock	500		
	Grizzly Main	500		
	Buckley-Summer Lake 1	500		

Table 1: Bonneville Power Administration Facilities Within Forest Service Lands				
WASHINGTON	FACILITY NAME	VOLTAGE(kV)	C. H. UNIT	LENGTH OF R.O.W. IN C.H. UNIT (MILES)
NATIONAL FOREST Mt. Baker-Snoqualmie	Grand Coulee Olympic	287		
	Maloney Ridge Auto Steamflow Gauge		SOS-1	14.4
	Chief Joseph-Monroe 1	500		
	Chief Joseph-Snohemish 3	345		
	Chief Joseph-Snohemish 4	345		
	Rocky Reach-Maple Valley	345	SOS-3	5.2
	Micro Station Rockdale			
	Rockdale Reflector			
	Rockdale-Maple Valley			
	Rocky Reach-River	500	SOS-4	9.4
	Vantage-Covington 1	500		
	Grand Coulee Raver 1	500		
	Grand Coulee Raver 2	500		
	Tacoma-Grand Coulee	287		
	Covington-Grand Coulee 1	230		
	Lake Wanatchee Hydro.			
	Mermit MW			
	Starvation Pt. Hydro			
	Stumpede Park LHF Ardenia	500	WN-5	5.6
	Chief Joseph-Monroe 1	345		
Olympic	Chief Joseph-Snohemish 3	345		
	Chief Joseph-Snohemish 4	345		
	Grand Coulee Raver 1	500	WS-2	0.9
	Grand Coulee Raver 2	500		
	Rocky Reach-River	500		
	Covington-Grand Coulee 1	500		
	Starvation Pt. Hydro	287		
	Grand Coulee Olympic	287		
	Vantage-Covington	500		
	Chief Joseph-Monroe 1	500	WN-1	3.5
Gifford Pinchot	Chief Joseph-Snohemish 3	345		
	Chief Joseph-Snohemish 4	345		
	Shelton-Fairmont No. 1	115		
	Shelton-Fairmont No. 2	115		
	Fairmont-Port Angeles 1	230	OLY-1	0.9
	Port Angeles-Supple	115		
	Shelton-Fairmont No. 2	230		8.9
	Hanford-Olympia	500		
	McNary-Ross	500	GP-4	2.1
	Lunk Mtn. RS	345		
Okanogan				



DEPARTMENT OF THE ARMY  
NORTH PACIFIC DIVISION, Corps of Engineers  
P.O. BOX 2870  
PORTLAND, OREGON 97208 2870

REPLY TO  
ATTENTION OF

Planning and Engineering  
Directorate

Mr. Jerald N. Hutchins, Team Leader  
Northern Spotted Owl Environmental  
Impact Statement Team  
P.O. Box 3623  
Portland, Oregon 97208-3623

Dear Mr. Hutchins:

Thank you for the opportunity to review the Draft Environmental Impact Statement (EIS) on Management for the Northern Spotted Owl in the National Forests. This is a very sensitive issue and we realize there is no "perfect" management for national forests comprised of so many natural resources.

The Corps of Engineers has management responsibility over its project lands that in many cases are adjacent to National Forest property. To the extent that such lands might offer management opportunities for the benefit of the Spotted Owl, please be advised that the Corps is always available to discuss the use of such lands with your agency.

Thank you again for the opportunity to comment on this report. Please contact Mr. Gary Bunn at (503)326-3832 if you have any questions regarding this subject.

Sincerely,

*Robert P. Flanagan*  
Robert P. Flanagan  
Director of Planning and  
Engineering

Table 2: Future Energy Corridors

WASHINGTON	FUTURE ENERGY CORRIDOR	C. H. UNIT
NATIONAL FOREST	C-1E	SOS-1
Mt. Baker-Snoqualmie	C-2E	SOS-3
	C-3	SOS-4
	C-4	SOS-4
Wenatchee	C-1E	WN-1, WN-5
	C-2E	WS-1
	C-3E	WS-2
	C-4	WS-2
	C-1B	WS-4, WS-5, WS-6
Gifford Pinchot	C-1B	GP-1
	C-5	GP-1, GP-2
	C-6	GP-4
	C-7E	GP-4
OREGON		
Mt. Hood	C-7E	O-1
	C-9E	MH-2, O-4
	C-10E	O-5
Willamette	C-11	WL-2, O-7
	C-12	O-8
	C-13	O-9, O-10
Deschutes	C-11	O-44
	C-12	O-45
	C-13	DES-1
Umpqua	C-14	O-12, O-13, O-14, O-15
Rogue	C-15	O-18
	C-16	O-18



## United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240



In Reply Refer To:  
ER 91/923

Mr. Jerold N. Hutchins, Team Leader  
Northern Spotted Owl EIS Team  
P.O. Box 3623  
Portland, Oregon 97208-3623

Dear Mr. Hutchins:

We have reviewed the draft environmental impact statement on Management for the Northern Spotted Owl in the National Forests in the States of Washington, Oregon and California.

Our comments are as follows.

### General

We have found the information and analysis provided for the Preferred Alternative which would adopt the conservation strategy of the Interagency Scientific Committee (ISC) to be generally adequate except for the following concerns. The DEIS did not contain a threshold determination for the marbled murrelet, a proposed species. This information should be included. Also, destruction or adverse modification of proposed critical habitat should be considered for each alternative. Conferencing with the Fish and Wildlife Service (FWS) should be requested if an action is likely to jeopardize the continued existence of a proposed species or would result in destruction or adverse modification of proposed critical habitat. In addition, it is recommended that the DEIS contain analysis and discussion of the impacts to candidate plant and animal species within the range of the northern spotted owl.

We understand that the FWS has already reviewed all alternatives during the informal consultation process pursuant to Section 7(a) of the Endangered Species Act of 1973, as amended. Formal consultation on the Preferred Alternative is ongoing. We recommend that the biological opinion and results of the consultation be included in the FEIS.

The Bureau of Mines in the Department of the Interior (DOI) has expertise and data currently available that will help to ascertain the effects that the designation of the Habitat Conservation Areas would have on mineral development and

Mr. Jerold N. Hutchins

-2-

subsequently, local, regional and national economies. Also, the Bureau is involved in several projects that should provide new information on mineral resources as well as socioeconomic impacts in the areas affected by the HCAs.

### Specific Comments

Interagency Scientific Committee Conservation Strategy, or "Thomas Report": Many of the recommendations of the Thomas Report are incorporated by reference without further analyses. While sections of the report are referenced and even reproduced, none of its assumptions are fully explained or analyzed in the DEIS. For instance, there should be an explanation regarding how the HCAs were actually delineated in the Thomas Report.

The 50-11-40 Rule: The basis for the application of this formula outside of HCAs is not explained. Environmental consequences are not analyzed relative to its application across alternatives. It is not clear if the closed forest canopy over 40 percent of the area means an average of the entire area, or if it means that there has to be at least 40 percent contiguous closed canopy.

Under the 50-11-40 Rule the habitat within the national parks could be considered the 50 percent that is managed for owl habitat. Application of the rule could lead to clearcutting up to national park boundaries, jeopardizing habitats and owls within the parks.

Viability Rating: The viability rating is used to arrive at the likelihood of persistence. However, it is not clear which period of time is viewed as persistent. The words high, medium and low are used to describe the likelihood of persistence in each alternative. It is not clear if these correlate with a specific number of years, or range of years. For instance, with the potential for adjustments and changes to areas and guidelines, it would be useful to know how a reasonably expected range of changes may change the viability rating for each alternative, especially if the adjustments are made on an incremental, project-by-project basis.

Acres Suitable for Timber Production: An explanation should be given as to how an area suitable for timber production is defined. In addition, the acres of suitable old growth contained within the 12,298,000 total suitable acres and what percent of total remaining old growth it represents should be enumerated as well as mapped against areas proposed for spotted owl habitat under each alternative. Suitable old growth appears to constitute 18 percent of



Mr. Jerold N. Hutchins

-3-

total suitable areas in Alternative A, and is reduced to 9 percent of the total in Alternative D.

**Description of Alternatives:** There are overlaps of areas between alternatives B,C, and D, with progressively more acreage included as owl habitat from B to D. While the guidelines and standards appear to be the same, they are all subject to adjustment in response to changing conditions, the meaning of which is unclear, but which seems to imply that the application of the guidelines and standards would not necessarily be consistent across alternatives.

Moreover, the latitude of adjustment and conditions under which areas and guidelines could be changed are not defined. It seems implicit that the amount of allowable cut could be increased and HCAs changed to accommodate the increase if the rationale is appropriate. In theory, the amount of acres eliminated from suitable timber by HCAs could vary according to the adjustments, and would not necessarily be removed on a direct acre per acre basis, as implied in Table S on page 22.

Nevertheless, each of the alternatives contains an "adjustment process" that allows for changing areas and guidelines and standards according to changing conditions, even on a project by project basis. Although it is assumed that these changes would be favorable for the owl, there is no language that specifies that changes to allow greater cuts would not be made.

**Indicator Species:** The northern spotted owl is considered to be an indicator species. Provisions for monitoring populations over the next few years should be established as part of this management effort as suggested in the ISC and other species thought to benefit from northern spotted owl management should be enumerated. It is possible that Vaux's swift, northern goshawk, fisher, gray wolf, and the marbled murrelet as well as other species, would be enhanced.

**Oregon Caves National Monument:** Oregon Caves National Monument contains a reproducing pair of spotted owls, and is occasionally inhabited by individual owls. The forest within the park is largely old growth, while much of the surrounding area has already been cut. Nevertheless, there is a remaining corridor of old growth that connects the monument to other forestlands. The corridor is not shown as designated HCA but its protection is vital to the survival of the pair and offspring, especially since the park itself is so small. It is critical that sections 9, 10, 15, 16, 21, and 22 within T.40 S., R.6 W. of Siskiyou National Forest be designated for protection if the owls are to persist within Oregon Caves.

Mr. Jerold N. Hutchins

-4-

**Crater Lake National Park:** Expanded protection of habitat adjacent to Crater Lake National Park is also needed. Much of the park is above the elevational limits of spotted owls, and their habitat tends to follow the park boundary. Consequently, suitable owl populations in the park are particularly susceptible to the effects of adjacent park activities. Most significant are owl populations along the entire western boundary of Crater Lake. Although extensive logging has occurred along the northern portions of this boundary, some areas of significant habitat remain. The areas are north of Highway 62 and must be protected if the most significant owl population of the park is to be protected.

There are also important areas along the southeast boundary and the east-central boundary of the park. Owls in this area represent an extreme in habitat use, possibly contributing to the genetic diversity of the subspecies. Given that these owls occur within a national park unit and the habitat in adjacent areas is disappearing, the Forest Service should actively cooperate with the NPS to ensure persistence of owls in the national park. The additional habitat that should be protected along the east-central boundary would include R.6 E., T.32 S., as well as R.7 E., from T.30 to T.32 S.

**HCAs within National Parks on Maps:** The Forest Service maps for this document show HCAs designated within national parks for alternatives B,C, and D. While they seem to indicate the overall Interagency Scientific Committee's recommendations, it is unclear as to why these areas are shown and if they have been counted in the acreages and analyses for viability and for the environmental consequences.

Thank you for the opportunity to comment.

Sincerely,

Jonathan P. Deason  
Director  
Office of Environmental Affairs

United States  
Environmental Protection  
Agency

Region 10  
1200 9th Avenue  
Seattle WA 98101

Alaska  
Idaho  
Oregon  
Washington



REPLY TO  
ATTN OF:

WD-126

Jerald N. Hutchins, Team Leader  
Northern Spotted Owl EIS Team  
U.S. Forest Service  
P.O. Box 3623  
Portland, Oregon 97208-3623

Dear Mr. Hutchins:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and s 309 of the Clean Air Act, we have reviewed the Draft Environmental Impact Statement (draft EIS) on **Management for the Northern Spotted Owl in the National Forests**. While satisfying court requirements, this EIS will amend the Regional Guide for the Pacific Northwest and Pacific Southwest Regions to provide management direction to the 18 National Forests within range of the northern spotted owl in California, Oregon, and Washington.

Based on our review, we have rated the draft EIS EC-2 (Environmental Concerns - Insufficient Information). Our concerns relate to presentation of alternatives, water quality, and fish habitat. Additional information is requested on fishery and spotted owl effects. This rating and a summary of our comments will be published in the *Federal Register*.

Thank you for the opportunity to review this draft EIS. We regret the delay in providing our comments. Please contact Wayne Elson at (206) 553-1463 if you have any questions about our comments.

Sincerely,

Ronald A. Lee, Chief  
Environmental Evaluation Branch

Enclosure

**Detailed Comments  
Draft Environmental Impact Statement on  
Management for the Northern Spotted Owl  
in the National Forests**

**GENERAL COMMENTS**

It appears that the alternatives are incomplete as they are presented in the draft EIS. Alternatives B, C, and D are based on the Interagency Scientific Committee's report "A Conservation Strategy for the Northern Spotted Owl" (Thomas, et al., 1990). They essentially consist only of geographic restrictions, however, and lack any additional mitigation measures or management practices that would be implemented in combination with the alternatives. It is unclear what additional measures would be included in each alternative.

For example, the draft EIS states on page 384-93 that "[i]f implementation of the Alternative B through D standards and guidelines hinders the current practice of aggressively salvaging root-rot killed Port-Orford-cedar, a key strategy for the control of this disease and maintaining Port-Orford-cedar is eliminated." The draft EIS neither identifies the Alternative B through D standards regarding disease management, nor indicates whether they would, in fact, hinder existing disease management practices.

As another example, on page 384-94, no recommendations for fire and fuels management are made in combination with the alternatives. However, the draft EIS suggests that the current fire suppression practices would increase large-stand replacement fires. It is unclear whether Thomas et al. have made any recommendations regarding disease or fire management. The first example above implies that owl habitat would be subject to a different standard (i.e., no human interference) than that which currently exists in the forest. The second example, however, implies that existing standards and guidance would be followed with no adjustments made for owl habitat.

We believe that the incompleteness of the management alternatives as presented in the draft EIS may implicitly skew the results of the alternatives evaluation. The final EIS should identify and evaluate any management practices (e.g., fire and disease management) that have been investigated and/or recommended by Thomas et al. If no such management practices have been investigated or recommended, we urge the U.S. Forest Service to evaluate reasonable alternatives for such management practices in the context of alternatives A through D.

**PAGE SPECIFIC COMMENTS**

2-19

The text states that, "Full implementation of the ISC Strategy, and the ISC's assessment of owl viability, was based on the assumption that all federal lands would be managed according to the ISC Strategy." The Bureau of Land Management (BLM) has not adopted critical components

of the ISC Strategy. This significantly affects the success of the Forest Service owl protection measures. Of spotted owl habitat included in the suitable timber land, 18% is managed by BLM and 80% by the Forest Service (page 65, ISC Report). The final EIS should consider, to the extent possible, the effect of non-adoption of the 50-11-40 rule on BLM lands to the viability of the owl on Forest Service Lands. (This would be similar to the approach taken by the Forest Service on cumulative watershed effects in multiple ownership watersheds.) The final EIS should consider localized owl dispersal and recruitment as well as isolation of Coastal Range populations from populations in the Olympic Peninsula and Cascade Range given BLM's proposed management approach. The cumulative effects of timber management on Forest Service, BLM, and state/private lands regarding owl habitat fragmentation, edge effects, and reductions in individual stand size should be included in the final EIS.

2-31

Notwithstanding habitat protection that would be provided under the proposed alternative, natural attrition of the current old-growth acreage would occur, primarily as a result of fires. It is unclear whether the proposed alternative would include a strategy for allowing younger stands to mature unharvested to old-growth over the next 100 to 200 years in order to sustain equivalent old-growth acreage value over the long-term in light of the timber management prescriptions for salvage.

2-53

The draft EIS states that increased timber production from private lands would be simulated as alternatives B, C, and D progressively reduce timber harvests on National Forest lands. It is unclear whether the induced shifts of employment/income from public land to private land has been factored into the employment/income analyses presented in the draft EIS (to wit, whether the employment/income estimates are the net figures after shifts to private lands have been made).

3&amp;4-118

The draft EIS states that BMPs are assumed to protect water quality and riparian and aquatic habitats. However, we believe that this statement is unfounded. In a meeting with Region 9 EPA on October 21, 1991, several California USFS officials informed us that due to limited resources, they are not able to monitor effectiveness of BMPs. We urge the Forest Service to develop and adopt a plan for monitoring implementation and effectiveness to validate water quality BMPs and northern spotted owl habitat areas. We also urge USFS to commit to this both in the final EIS and Record of Decision.

3&amp;4-119

The alternative selected by the Forest Service may have significant implications for successful management of other species and resources. The draft EIS states that the proposed alternative would have "a very-low to low probability of maintaining viable populations of sensitive fish stocks..." While we understand that the primary intent of this EIS is to

provide management direction for the northern spotted owl, and that future NEPA documents for timber sales will address fishery issues, the potential connection between regional guidance for the owl and management of sensitive fisheries should be discussed in the final EIS. The statement above is also confusing in light of the statement in the draft EIS on the previous page that BMPs, standards and guidelines, and mitigation measures are assumed to be protective of water quality, riparian areas, and aquatic habitats.

3&amp;4-132

The final EIS should discuss how each alternative would affect the lumber export market and whether any employment/income shifts could occur as a result of export market changes.

3&amp;4-163

According to the draft EIS, the quality of fisheries may be enhanced by maintenance of areas managed primarily for spotted owl habitat. However, no economic analysis is attempted, so it is not clear to what extent the positive impact could potentially offset the employment/income/revenue impacts of reduced logging in the region. Furthermore, in light of the statement elsewhere in the draft EIS (page 3&4-119) that sensitive fish species would be adversely affected by the proposed alternative, it unclear why commercial fisheries would not be adversely affected as well.

SUMMARY OF THE EPA RATING SYSTEM  
FOR DRAFT ENVIRONMENTAL IMPACT STATEMENTS:  
DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

Lo--Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal.

EC--Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EO--Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory to the EPA. The review may have disclosed opportunities with no more than minor changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal.

Adequacy of the Impact Statement

Category 1--Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project. The review may have disclosed opportunities with no more than minor changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal.

Category 2--Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to provide adequate protection for the environment. The review may have disclosed opportunities with no more than minor changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal.

Category 3--Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed. The review may have disclosed opportunities with no more than minor changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal. The review may have disclosed opportunities with no more than minor changes to the proposal.

\*from EPA Manual 1600 Policy and Procedures for the review of Federal Actions Impacting the Environment

The Resources Agency



of California

Pete Wilson  
Governor

Douglas P. Wheeler  
Secretary

California Conservation Corps • Department of Biological Resources • Department of Conservation  
Department of Fish & Game • Department of Land & Air Resources • Department of Parks & Recreation • Department of Water Resources

December 26, 1991

USDA - Forest Service  
Spotted Owl EIS Team Leader  
Attn: Mr. Gerald N. Hutchins  
P. O. Box 3623  
Portland, OR 97208  
Dear Mr. Hutchins:

The State has reviewed the Draft Environmental Impact Statement on Management for the Northern Spotted Owl in the National Forest, in the State of California, submitted through the Office of Planning and Research.

We coordinated review of this document with the Air Resources Board, the State Lands Commission, and the Departments of Conservation, Fish and Game, Forestry and Fire Protection, and Parks and Recreation.

The Department of Fish and Game has provided the attached comment for your consideration.

Thank you for providing an opportunity to review this project.

Sincerely,

*Carol Whiteside*

Carol Whiteside  
Assistant Secretary  
Intergovernmental Relations

Attachment

cc: Office of Planning and Research  
1400 Tenth Street  
Sacramento, CA 95814  
(SCH 91094011)

The Resources Building Sacramento, CA 95814 916/553-3636 FAX 916/553-8102

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Energy Resources Commission • Development Commission • State Lands Commission • State Reproduction Board

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State of California

## Memorandum

To 1. Projects Coordinator  
Resources Agency  
December 20, 1991

2. Mr. Edward G. Hadigan  
Department of Agriculture  
Post Office Box 3623  
Portland, Oregon 97208

From Department of Fish and Game

Subject SCH #91094011 - Draft Environmental Impact Statement (DEIS) on Management for the Northern Spotted Owl (NSO) in the National Forest

Department of Fish and Game personnel have reviewed the DEIS on management for the NSO in the national forests. This impact statement proposes four alternatives for managing the national forests to provide for a viable population of spotted owls. Management for spotted owls may affect the extent and rate of timber harvest of older forest areas and may result in major changes in the management of older forest areas. The proposed alternatives and guidelines from the alternative selected will be incorporated into the management of the national forests. The kinds, amounts, and locations of habitat resources will directly affect the size and distribution of associated populations of NSO's. Such habitat conditions can influence population viability.

Our review of this document has been limited to only those issues pertaining to the biology and ecology of the NSO and management of this species in the national forests (Six Rivers, Klamath, Shasta-Trinity and Mendocino) within California.

The potential environmental consequences of the proposed alternatives relative to the designated areas to be managed for spotted owls is described in the DEIS. A possible negative effect on the forest areas managed for spotted owls was described as resulting from insects and disease, producing snags and leading to catastrophic fire and for reducing viability of Port Orford cedars susceptible to root rot. Habitat protection for the benefit of spotted owls is described as increasing accessibility to infected stands. Negative effects in these analyses become more negative as the area proposed for protection of spotted owl habitat increased.

Some effects of managing primarily for the spotted owl could be either positive or negative or unknown including:

1. Pacific yew would be more plentiful, but less accessible.
2. Fuel management could be impacted because funding is linked to timber harvest.
3. Development of mineral resources (geothermal, oil and gas) could be impacted.
4. Road development would be limited.

Positive effects of managing national forests primarily for the spotted owl were described for other listed threatened and endangered species most forest dwelling wildlife species, watersheds, fisheries and soils, visual qualities, cultural resources and Native American religious sites. Positive effects in these analyses became more positive as more spotted owl habitat was protected. The positive effect was the result of reduced disturbance.

1. Projects Coordinator
  2. Mr. Edward G. Hadigan
- December 20, 1991  
Page Two

Consultation with the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act is being conducted for all alternatives.

### Alternative A: Spotted Owl Habitat Areas (No action alternative).

This alternative would manage the forest as directed by the forest plans. Forest plans for northern California national forests are still in draft stage and the regional guide is currently providing the management direction for owl and spotted owl habitat management. Management for spotted owls will result from current management practices. The district court has ruled that no change in management strategy does not constitute compliance with the National Forest Management Act. Spotted owl habitat would be managed by maintaining spotted owl habitat areas.

This alternative has been assigned a low viability rating in the DEIS. The viability rating was used as an index of the likelihood of population persistence over the short and long term under this alternative. Viability rates over both the short and long term under this alternative.

A predicted net decrease of over one million acres of spotted owl nesting, roosting and foraging habitat over the next 50 years is associated with this alternative. A minuscule net increase of habitat is predicted at a rate of 0.08 percent between 100 and 150 years in the future.

This alternative is not considered acceptable because it does not adequately provide protection for spotted owl habitat and does not provide provisions for the recovery of the species on the short or long term. This alternative allows continued fragmentation of habitat and isolation of spotted owl populations which would likely result in a loss of genetic variation within the population. The DEIS states that "the degree of genetic variation in a population determines how well the population can adapt to changes in the environment." Small, isolated populations are particularly vulnerable and unable to adapt to changes in the environment. The presence of predators and a host of other environmental factors. The net decrease of spotted owl habitat will further contribute to the decline of the species.

### Alternative B: Interagency Scientific Committee (ISC) Conservation Strategy.

This is the preferred alternative in the DEIS and would manage the forest as described in the ISC 1990 report (Thomas report). "A Conservation Strategy for Northern Spotted Owls". The ISC has designated habitat conservation areas (HCA) and described standards and guidelines in their report.

In California, 99 HCA's were established within three physiographic provinces which now provide habitat for 293 pairs of NSO and will potentially provide habitat for 1,000 pairs of NSO. The ISC report states that "timber harvest activities would be 'very limited' and other activities would be 'very limited' in the HCA's. The national forest outside of the HCA's will be managed by the 50-11-40 rule which specifies that for a quarter township (nine square miles) that 50 percent of the landscape will be maintained in stands where trees will have a minimum 11-inch diameter (breast height) and a minimum canopy of 40 percent.

This alternative predicts a high likelihood of population viability over the short and long term, but could result in net loss of 360,000 acres in spotted owl nesting, roosting and foraging habitat during the next 50 years. A 10 and 22 percent increase in owl habitat is expected during the 50-100 and 100-150-year periods (respectively) in the future.

1. Projects Coordinator
  2. Mr. Edward G. Madigan
- December 20, 1991  
Page Three

While providing a high likelihood of population viability with suitable habitat, Alternative A1 does not provide suitable habitat areas and enhanced occupancy rate within clusters (than in Alternative A1, all these attributes are unobtainable or negligible in the near future and are all essentially long-term benefits.

This alternative is not acceptable. This alternative does not provide adequate short-term protection for spotted owl habitat that may be important to the recovery of the species. The proposed management plan is a conservative approach to management of spotted owl habitat is warranted. This approach will satisfy the district court order and most importantly, avoid exacerbating or eliminating recovery options which now exist. The alternative which offers the greatest protection to the habitats identified as suitable for NSO and within the scope and control of the U.S. Forest Service (USFS) should be set aside pending completion of a recovery plan.

#### Alternative C: ISC Conservation Strategy Plus Critical Habitat.

This alternative proposes that the ISC conservation strategy be adopted and that the USFS August 13, 1991, designation of critical habitat be applied in addition.

Timber harvest would be "very" restricted and other development activity limited in the MCA's and critical habitat areas. National forest areas outside the MCA's and critical habitat areas will be managed by the 50-11-40 rule.

This alternative has been rated in the OFIS with a high likelihood of population viability. The alternative would provide a high likelihood of recovery by increasing habitat base over the long term would aid in providing for larger spotted owl population sizes over time and that with larger designated habitat areas, distribution would be in more suitable, larger and more contiguous blocks.

For this alternative, a net increase of four percent in spotted owl nesting and foraging habitat is predicted over the next 50 years and will increase suitable habitat from 1.5 million acres to 1.54 million acres and increase of spotted owl habitat within the next 150 years.

This alternative is not acceptable at this time as it is presently proposed. The Department has previously expressed disagreement with the proposed USFS designation of critical habitat within California because it would require the USFS to restrict timber harvest in critical habitat areas. The public coordination process for this proposal is ongoing. The USFS is required to publish a final designation of critical habitat by October 1991. Other Federal, State and private lands may be designated as critical habitat.

Further, this alternative is not acceptable because in California, timber harvest has continued to occur through implementation of Board of Forestry interim rules based on USFS guidelines. With USFS approval, the Department and the California Department of Forestry and Fire Protection have coordinated in reviewing timber harvest plans within critical habitat areas of the NSO. This process has and will continue to identify the potential for harm or harassment of NSO's and determine the effects of any proposed plan on the species. Specific mitigation will be proposed for those plans that may impact the NSO. Pending completion and approval by USFS of a habitat conservation plan (HCP), recovery of the species is not specifically addressed by the interim rules. Suitable habitat presently occupied can be harvested thereby resulting in the loss of potential for future occupancy by dispersing NSO's which is essential to subsequent recovery.

The potential for loss of habitat on private lands that has been designated as critical for the recovery of the species necessitates that a greater proportion of suitable habitat on public land be protected in the interim pending a final recovery plan and a HCP in California.

1. Projects Coordinator
  2. Mr. Edward G. Madigan
- December 20, 1991  
Page Four

Current inventories indicate that there are nearly 7.6 million acres of nesting, roosting and foraging habitat within the range of the NSO of which nearly 75 percent or 5.7 million acres is on lands administered by the USFS. Of the 825 pairs of NSO's reported for California in Tables 3, 4 and 5, "Habitat Acres and Owl Pairs on all Lands" which includes data from both public and private lands through July 1991, 525 or 64 percent occur on USFS lands.

#### Alternative D: ISC Strategy Plus All Nesting, Roosting and Foraging Spotted Owl Habitat.

This alternative adopts the ISC strategy and further protects all NSO nesting, roosting and foraging habitat. Timber harvest activity will be restricted to areas designated as suitable habitat. Nesting, roosting and foraging habitat will be managed by the 50-11-40 rule.

This alternative has been rated as having a high likelihood of viability of spotted owl populations on national forests over the short and long term and will increase suitable habitat over the next 50 years with an overall net increase of 2.4 million acres within 150 years.

The Department recommends that this alternative be selected at least until the recovery plan has been finalized and a long-term management plan is developed. The OFIS summary provided an analysis of the "Future Changes and Impacts" of the proposed alternative. The OFIS states that to comply with the district court injunction, revised management plans for forest lands to be incorporated into the forest plans immediately to be in effect for project-level planning. This direction will only be in place, however, until a long-term strategy for management of the owl is adopted following the recovery plan. At that time, the effects of management requirements for the owl on the owl population will be evaluated. The Department can take action taken to provide for a long-term management plan for the owl and the action taken to further amend or to revise the forest plans as appropriate. The Department plan being prepared by the USFS is expected to include in its description of critical habitat, State, private and other Federal lands.

The selection of this alternative will allow the most options to be available for implementation when a recovery strategy is adopted. The short-term management plan will provide for the recovery of the owl, but restricts the use until long-term management and other uses of the forest, including timber harvest, are incorporated. Those measures to be identified as necessary in the recovery of the species and lead perhaps to eventual delisting of the spotted owl in California.

Department personnel are available to discuss our concerns and recommendations. The Department is currently conducting a public coordination process regarding this matter or would like to schedule a meeting, please contact the Department's Regional Manager for the Department's Region 1, 601 Locust Street, Redding, California 96001 (916-225-2363) or Mr. Brian Hunter, Regional Manager for the Department's Region 3, Post Office Box 47, Yountville, California 94599 (707-944-5500).

*Howard A. Samuels*  
Pete Bontadelli  
Director

BILL MARKHAM  
COULDS AS  
W. J. KESSELMAN AND  
N. W. JACKSON COUNTIES  
DISTRICT #6

REPLY TO ADDRESS INDICATED  
☐ Bill Markham  
Salem, Oregon 97310-1347  
☐ Rt. 1, Chardbrook Loop Rd.  
Hills, Oregon 97123



HOUSE OF REPRESENTATIVES  
SALEM, OREGON  
97310-1347

December 24, 1991

Jerald N. Hutchins, Team Leader  
Northern Spotted Owl EIS Team  
P.O. Box 3623  
Portland, Oregon 97208-3623

RE: Draft Environmental Impact Statement on Management  
of the Northern Spotted Owl in the National Forests

Dear Mr. Hutchins:

As a landowner and the elected Representative of the 46th House District, I would like to offer the following comments relative to the Forest Service's "Draft Environmental Impact Statement on Management of the Northern Spotted Owl in the National Forests".

The adoption of the Jack Ward Thomas strategy, or any variation of it, must first be accompanied with a thorough review of the assumptions and conclusions therein. The recent reports by several scientists that call into question the logic and scientific validity of the Thomas report must be addressed. It appears that the Thomas committee adopted a strategy that exceeded their own interpretation of the biological needs of the species.

The Draft EIS fails to discuss the true impacts on the rural timber dependent communities. The National Environmental Policy Act requires that the effects of the proposed action on the human environment be fully documented, yet the Draft EIS fails to discuss the impacts on a site specific basis. It is improper and morally dishonest to treat the impacts on a region wide basis with the disproportionate impacts on the rural communities. It is essential that a community by community analysis be conducted.

As a legislator who is responsible for developing public policy and in turn facing my electorate, I am dismayed at the failure of the Forest Service to explore alternatives which mitigate the social and economic impacts. It is unfathomable to me that variations in the boundaries, viability standards and even timber management practices were not considered in the development of alternatives.

It is equally amazing to me as a forest owner that no consideration was given to adaptive management strategies to create habitat.

All of the forest conditions which are allegedly necessary for the northern spotted owl can be created through existing timber management practices.

At this time I am unable to support any of the proposed alternatives. Given the absence of a true range of reasonable alternatives and the absence of any recognition of the human impacts the environmental impact analysis is totally unacceptable until the true impacts upon the human environment are revealed and a site specific environmental impact statement is developed it is impossible to fully analyze the impacts of the various alternatives.

Sincerely,

*Bill Markham*

Bill Markham  
State Legislator

BARBARA ROBERTS  
GOVERNOR



OFFICE OF THE GOVERNOR  
STATE CAPITOL  
SALEM, OREGON 97310-0370  
TELEPHONE (503) 378-3111

December 26, 1991

Mr. Jerald N. Hutchins, Team Leader  
Northern Spotted Owl EIS Team  
P.O. Box 3623  
Portland, Oregon 97208-3623

Dear Mr. Hutchins:

The State of Oregon welcomes this opportunity to comment on the Forest Service's Draft Environmental Impact Statement (DEIS) for management for the northern spotted owl.

We are aware of the short time frame given by the courts to complete the work required for the DEIS and note that this has made it difficult for the Forest Service to conduct detailed analysis on many items. We hope these inadequacies will be remedied in the final Environmental Impact Statement.

In its preparation of the final impact statement, the Forest Service must try to incorporate the most recent owl material available. In particular, work by the Recovery Team and the "Gang of Four" should be incorporated into any final analysis. In addition, the analysis provided by the Forest Service must cover more fully social and economic impacts, recreational benefits, economic assessment of non-timber (including "non-market") resources, and implications for adjacent ownerships.

Sincerely,

Bob Warren  
Special Assistant for  
Forest Policy  
Governor's Forest Planning Team

BW:LC  
Attachment

State of Oregon Comments  
to the Forest Service on the  
Draft Environmental Impact Statement on Management  
for the Northern Spotted Owl in National Forests

December 26, 1991

The State of Oregon appreciates this opportunity to comment on the Forest Service's Draft Environmental Impact Statement (DEIS). The state was actively involved in the Forest Service (FS) planning process and will continue this involvement in the monitoring and implementation phases of the plans. The state wishes to remain closely involved in all aspects of the FS planning process and submits the following comments on the DEIS for management for the owl as part of this ongoing effort.

We recognize the short time frame available for the preparation of the FS DEIS and appreciate that this has not allowed for full coverage of all impacts. In our comments we suggest where additional work is required and focus on issues of major concern to the state.

We recommend that the preferred alternative be chosen on the basis of the best available scientific knowledge which will enable preservation of the northern spotted owl. At the same time, the FS should seek to minimize social and economic costs to timber-dependent communities and workers. Importantly, the FS should be aware of the impacts at a local level to those people engaged in the forest products industry.

Our comments cover two main areas:

1. Incorporation of new data.
2. Adequacy of the analysis.

1. Incorporation of New Data

The FS has relied heavily on the Interagency Scientific Committee material to provide a framework for developing its alternatives. We consider it extremely important that the FS make as much use as possible of more recent work which includes new inventory data. In particular, we strongly suggest that, where possible, the FS incorporate the Recovery Team's data, analysis, and recommendations, together with the work carried out by the "Gang of Four".



We also suggest that the FS consider this new information in the light of refining the existing ISC work. In the longer term, it is important that FS allow itself sufficient flexibility in its plans to enable it to adjust management techniques as new information and the results of monitoring become available.

We note that the ISC strategy is a multi-agency strategy involving both federal and state agencies. Any action taken by one agency will affect the overall viability of the ISC work and hence the effectiveness of action taken by the other agencies. With 95 percent of owls on federal lands in Oregon and 60 percent of the entire population of the subspecies in Oregon, federal lands in Oregon have a key role to play in the preservation of the owl.

## 2. Adequacy of the Analysis

### a) Social and Economic Analysis

Neither the economic nor social impacts are dealt with adequately, and there is virtually no discussion or analysis by alternative of the expected impacts. The state considers that analysis of these impacts is vital to an understanding and selection of the preferred alternative and expects a fuller impact analysis to occur before selection of the final alternative.

Economic impacts are more than job loss and loss of harvest revenues to counties. The state expects the FS to work towards a complete analysis of the full range of economic impacts.

The impacts to counties section should be enlarged to include other financial impacts. Property values can be expected to decline with declining harvest levels and this will impact county finances. We draw your attention to a fuller discussion of this issue contained in the attached critical habitat comments to the Fish and Wildlife Service. The FS should also include log flow data which would be used to show which communities would be most severely impacted by each of the alternatives and how.

While the FS has acknowledged direct, indirect, and induced job loss, these elements are not separated out, and it is difficult to interpret just what the impacts are. The multiplier for indirect jobs appears low, and we recommend that the FS examine this more closely and use the employment data available from the State Employment Division.

Social impacts are more than a simple function of job loss. Location (and hence ability to find alternative employment) and viability of existing industry are also important determinants and should be taken into consideration. To be accurate, social impacts must be analyzed at a community level, and this requires a clear articulation of those counties and towns most affected. It is not

sufficient to describe general social impacts when the effects are obviously highly variable among communities. It is also not sufficient to vaguely state that impacts will increase with each alternative without giving any indication of the magnitude of the impacts.

Social costs are two-fold; the personal costs, in terms of human suffering, of forest products workers and their families; and the financial costs, largely borne by the state and community organizations, of providing increased social welfare services to those most in need. When analyzing social impacts, the FS must consider both of these costs, for example, what will each job lost mean in terms of increased use of government and non-government welfare and social services? When state revenues are declining, there is an increased need for these services. The cost of providing social services could have been determined (at least in a case example sense) by polling the local governments responsible for providing such services.

The FS should not only articulate that social impacts will occur, it should quantify what they are and articulate what mitigation procedures will be followed. The cost of these mitigation measures should be factored into the cost of owl preservation.

### b) Recreation

The state has detailed information on recreation demand, and we suggest the FS examine this together with the not inconsiderable literature available on supply and demand relationships. It is not acceptable to dismiss the contribution of recreation to overall economic benefits as is done on 344-162: "Without considerable analysis of the relative supply and demand of each type of recreation use, it cannot be determined whether the net change in overall recreation use and benefits would be positive or negative due to maintaining various levels of designated areas managed primarily for spotted owl habitat."

In particular, the FS should undertake an analysis on the potential for semi-primitive recreation opportunities on or near areas set aside for owls. The demand for this type of recreation is growing and is not satisfied by current supply.

We note that the state has already dedicated considerable financial resources (\$25 million in the last two biennia) to tourism and recreation strategies as part of an effort to encourage communities to diversify economically. The state considers recreation to be an important source of alternative revenue in many timber-dependent areas and would like to work with the FS to develop complementary strategies which would enable the most efficient use of all available resources.

c) "Non-market contribution"

The non-market section is very inadequate. Recreation which is included in this section has a definite market contribution, and we suggest that the FS examine recreation as a possible economic gain associated with preservation of the owl. The FS needs to seriously consider the recreational benefits associated with different management practices. It should look at the potential benefits to communities already undertaking enhanced strategies. Similarly, fisheries are an important economic resource (as indicated on p344 - 163) and should be treated as such.

Further, the non-market contribution is greater than visual and "existence values". Other factors such as other species (some of which, such as elk, deer, and yew have commercial value), watershed enhancement, and air and water quality will be affected by related management decisions and must be included in the analysis if it is to have any validity.

The studies cited to demonstrate that people would be willing to pay more for wood products to enable spotted owl preservation are inadequate to demonstrate this point. The studies contain untested assumptions. In particular, where studies are carried out in areas where people are unaffected by changes in the forest products industry, their willingness to pay more for products is not a true reflection of the implications for those directly engaged in the industry.

While the state recognizes that it is difficult to obtain data on this area, it is not sufficient to cite studies with questionable results and considerable shortcomings only to conclude that the results remain unsettled. If the FS is serious about doing more work on this issue of other benefits and costs, then it should conduct more research. As this is an issue which will continue to be important in forest planning activities, we strongly recommend that the FS start work to fill this gap.

d) Mineral and Energy Resources

The DEIS has discussed the widespread occurrence of locatable saleable, and leaseable minerals throughout the range of the owl together with the prospectively valuable geothermal resources located in the Cascades. Oil and gas resources are stated to be considered prospectively valuable in the Siuslaw National Forest. In fact, oil and gas reserves have historically been explored for in many of the Habitat Conservation Areas, including the Coast Range and Willamette Valley.

The economic importance of mineral and energy resources is significant and on a per-acre basis often exceeds timber values.

This involves tens of millions of dollars of past, present, and future mineral production. These economic impacts should be analyzed and expanded in the DEIS to include a balanced determination of mineral and energy economic impacts. We note that many mineral exploration and production projects occupy very little surface acreage and would not be disruptive to owl habitat.

The Environmental Consequences discussions in Chapters 3 and 4 state that withdrawal of areas from leasing may not be prudent, since energy exploration activities impact very few acres. This approach should be pursued for locatable, saleable, and leaseable minerals which affect a minimal area and have a significant economic impact of tens of millions of dollars.

e) Activities on Adjacent Land

The FS should expand its alternatives analysis to identify potential limitations on management and development activities conducted on state-owned and private lands adjacent to owl habitat areas. We refer you to the state's October 15, 1991 comments to the Fish and Wildlife Service on critical habitat (attached) and draw your attention to the discussion on activities and uses in and near owl habitat areas.

There is a very real need for the FS to work closely with local planning authorities on all aspects of management plan development. To be most effective, federal, state, and local efforts must be coordinated.

State of Oregon Comments

to

U.S. Fish and Wildlife Service

on

the Revised Proposal to Designate Critical Habitat

October 15, 1991

Introduction

The State of Oregon welcomes this opportunity to comment on the Fish and Wildlife Service's revised proposal to designate critical habitat. The state supports federal action to protect the owl, and we are pleased to see that the FWS envisages that this can be done with the removal of private and some Native American lands from critical habitat designations.

In terms of process, we applaud the FWS for its decision to work closely with the Owl Recovery Team. We hope this will eliminate duplication of effort and, through coordination, allow more comprehensive, logical planning for the owl's recovery to occur.

Our comments cover two main areas of concern:

- A. Adequacy of the analysis
- B. Requirement for balancing biological analysis with economic and social analysis.

We recommend that FWS work further on these two areas in order to achieve a credible end product. In particular, we stress the importance of taking full account of the massive public comment received during both the first and second round of public hearings. On the basis of the revised proposal, it does not appear the public comments have been adequately factored in to the FWS analysis. In particular, we note that scant attention has been given to social impacts. Thorough analysis of social impacts is crucial given the magnitude and timing of potential impacts, especially in rural areas where alternative employment opportunities are limited.

As an overall comment we note with concern that Oregon is paying a much higher price for critical habitat than either Washington or California. The release of private land will provide the most economic benefit to Washington, especially the few large industrial timberland owners. Release of private land will not be of as much benefit to Oregon, where many communities depend on federal timber.

Of the total reduction in timber value from the national forest plans for all three states due to ISC listing, and critical habitat, Oregon assumes 57 percent of the total, just looking at the reductions in timber value due to designation of critical habitat, Oregon absorbs 81 percent of the reduction. There is a similar situation with regard to employment impacts. Oregon loses 71 percent of the jobs caused by reductions in ASQ from ISC, listing and critical habitat combined. Oregon loses 78 percent of the jobs caused just by the critical habitat designation.

The reductions in payments to counties are much more dramatic in Oregon because of the dependency on and amount of federal lands involved. Eighty-seven percent of the reduction in payments to

counties due to critical habitat designation will be borne by Oregon.

While we remain firmly committed to compliance with the Endangered Species Act, we believe the FWS has failed to adequately address the balancing of economic and social impacts that is legitimately available in connection with the designation of critical habitat.

#### A. Adequacy of the analysis

##### 1. Owl populations

We strongly recommend that the FWS work closely with the Owl Recovery Team, the US Forest Service, and the Bureau of Land Management biologists to provide the most up-to-date and accurate owl numbers possible. Recent owl surveys, with more complete data, have demonstrated higher owl numbers than previous surveys. For example, the BLM has just revised its data on owls on BLM lands from 124 pairs, 144 singles and 146 juveniles in 1989 to 486 pairs, 184 singles and 329 juveniles in 1990.

##### 2. Owl habitat

Observations in state forests, national forests, and on BLM lands indicate that nesting owls are not found exclusively in old growth forests. A great deal of evidence suggests that, while owls may prefer old growth, they also occur in a wide variety of habitats in Oregon, a situation which also occurs in northern California. If owls are living, breeding, and nesting in non-old growth forests, then it is very important to determine how much flexibility there is for including different ecosystem types and management in critical habitat. We suggest that Fish and Wildlife Service undertake further biological analyses and thoroughly survey owl populations.

##### 3. Activities permitted in owl habitat

A major failing in the current analysis is that it does not provide information on those activities and land uses that will be allowed in critical habitat. This information is required under the Endangered Species Act, Section 4 (c) (4), which requires "description and evaluation of those activities (whether public or private) which, in the opinion of the Secretary, if undertaken may adversely modify such habitat, or may be impacted by such designation."

Without information on the management restrictions that are likely to be imposed in critical habitat, it is impossible for anyone to comment accurately on the impacts the designation will have. We

restate our previous comment that in order for the state, local governments, and others to provide an accurate biological and economic assessment, it is necessary to know what constitutes adverse modification. We again ask FWS to make this information available.

Some of the proposed critical habitat area lies within municipal watersheds. We are concerned that management activities necessary for the maintenance of these municipal water supplies may be impeded. Watershed operators need to have periodic access to maintain water storage or distribution facilities, check on conditions that may affect the quality or flow of water (e.g., landslides, blowdown, beaver dams), or call for remedial action to protect the water supply (e.g., revegetate denuded slopes, remove excessive fuel loads to lessen fire danger). The extent to which management of municipal watersheds will be allowed to continue in critical habitat needs to be addressed in the rules.

FWS must also examine the cost of not allowing certain management activities. For example, if remedial actions to protect water from excessive sediment loads is not allowed, the cost of water treatment to those community watersheds currently without filtering systems could be significant. In addition, some municipal watershed districts have plans to develop storage or distribution facilities to accommodate future growth. Such plans may call for disturbance and land modification within critical habitat areas.

For example, Bull Run watershed is the major water supply for the Portland metropolitan area. In order to provide for the continued development of Bull Run to meet demand and to enable flexibility in management to ensure water quality, critical habitat designation of Area O-1 should be modified. The following activities should be permitted in Bull Run: operation and maintenance of existing water supply, development of new storage, diversion, transmission and treatment facilities, and prevention or mitigation of activities that could result in water quality degradation. For more detail, we refer you to the comments provided to you by the City of Portland Bureau of Water Works. FWS should provide similar flexibility for other municipal watersheds in critical habitat.

We believe that management flexibility is essential to accommodate future municipal water needs. Therefore we recommend that FWS consider municipal watersheds in delineating critical habitat and we encourage FWS to work closely with the state and affected municipalities and districts in developing plans for ensuring adequate water supplies.

Where critical habitat is designated in O&C areas with a checkerboard pattern of private and public ownership, will any management be allowed in federal lands adjacent to private lands? Rural interface lands present special management challenges, and activities such as fire prevention and new road access to public



(or private) lands could be impossible if they cause jeopardy. If this is the case, some private lands could be functionally unmanageable.

Native American lands have been removed from critical habitat designation in large part because of management practices based on selective logging. Is there potential for similar management to be practiced on federal lands, thereby reducing the amount of critical habitat on these lands? We strongly recommend that FWS work with the Owl Recovery Team subgroup working on different silvicultural practices to determine how modified management practices could be incorporated into the critical habitat designation.

#### 4. State lands

A hundred and sixty-five thousand acres of state lands were designated as critical habitat in the pre-proposed rule. One hundred and thirty thousand acres still remain in the revised critical habitat. This is despite protection of owls under State Board of Forestry regulation.

The Oregon Forest Practices Act is the sole regulation mechanism for commercial forest operations (silvicultural practices that affect environmental values and land use). The Oregon Board of Forestry has the rule-making authority under this Act, which is EPA-approved as the regulation mechanism in compliance with the state's duty under the Clean Water Act. Similarly approved under the Clean Air Act, the Forestry Department administered Smoke Management program also regulates commercial forest operations that have significant effects on air quality.

The Oregon statutes treat such commercial forest operations as harvesting, road building, and the application of chemicals in accordance with the approved label instructions as an outright permitted use, subject to legitimate constraints. These constraints are specific to protect the public's interest in public health and safety; maintenance of air and water quality; and the continuous productivity of Oregon's forest soils, special fish and wildlife habitat sites, and other land-use concerns, and, most recently, clearcut size and scenic highways.

Inasmuch as there is the statutory presumption of permission, Oregon's regulatory posture is significantly different from other states without such a presumption. The commercial forest operator in Oregon encountering occupied habitat of the northern spotted owl must comply with the federal Endangered Species Act requirements concerned with prohibition on "take" of the owl, as well as state requirements to protect the "site" used by the owl. The Board of Forestry rule specifies that a "core area" of 70 acres of the best available habitat is the "site" to be protected under its authority. Department enforcement officers, Forest Practices

Foresters, advise operators that compliance with the state requirements does not absolve them from (nor does it necessarily fulfill) the requirement in the federal statute to avoid "take".

The retention of 130,000 acres of state forests when private lands have been deleted is unjustified. FWS has not presented any rationale that justifies such a vast inclusion. Large acreages of state ownership in critical habitat include five to 30-year-old plantation-grown Douglas fir which has similar characteristics to that in adjacent private land. This type of vegetation is not shown as habitat in any of the criteria listed in the Federal Register, much less shown as needed for critical habitat.

We seek a more thorough analysis and discussion of the inclusion of large areas in the northern coast range with no known spotted owl activity. These areas consist largely of trees roughly 60 years of age that were reforested after the area was repeatedly denuded by catastrophic wildfires 45-58 years ago (the Tillamook Burn). As a result, spotted owl habitat has been completely absent for nearly 60 years from the area. While restoring the spotted owl to areas within its historic range may become a goal of the Recovery Plan, historic range is not stated as a goal in designating critical habitat within the Federal Register notice, and certainly not within the Endangered Species Act provision relating to critical habitat.

There are areas adjacent to, but outside of, critical habitat that contain older trees. In some cases, this forestland is protected due to the presence of owls. Even though these areas are in private and state ownership, they will likely be providing nesting and roosting habitat sooner and at a lower economic cost than the areas inside the boundaries shown for critical habitat.

On federal lands, it appears from the maps, as well as from the text in the economic analysis paper, that critical habitat boundaries were chosen to include old timber and to exclude young timber. We question why this strategy was applied inconsistently on state and private lands.

FWS needs to discuss the values to be gained by including state forest lands in critical habitat and of the values to be lost if these lands are not included in designated critical habitat. Other than managing for existing owls to avoid "take" there is no legally binding mechanism that will ensure that state land inside the boundaries will be managed to promote critical habitat conditions for the owl.

Given that most state forests are managed under a trust relationship that is constitutionally or contractually required, we would like to know what provision FWS will make to protect the rights of the trust. The law provides that trustees have a responsibility to their beneficiaries. We believe that it is

possible for state forestlands within critical habitat to be managed to provide for trust responsibilities and owl habitat. In other words, it is possible to comply with both mandates. We note that without federal nexus, there is no compelling or rational reasoning that would protect forest characteristics when doing so would require postponing or foregoing timber harvests. Will FWS compensate the state for the substantial loss in revenue?

#### 5. Economic Impacts

The state is concerned about the severe economic impacts that the designation of critical habitat will have on timber workers, their families, and their communities. Where federal actions lead to job loss, the state considers it important that the federal government provide a benefit package.

Working together, the governors of Oregon and Washington have developed a seven-point plan for federal aid (Appendix 1) to ameliorate impacts. We recommend that the items covered in this plan be addressed.

The State of Oregon's comments on the pre-proposed rules emphasized the need to analyze the real costs and determine who will be required to pay them. This was not done. The state also was concerned about the credibility of the approach used by FWS so that it would not appear that the Service was trying to support a point of view using the economic analysts. The overall tone of the economic analysis is still not objective. The analysis is clearly aimed at justifying the proposed decision rather than identifying all costs and benefits. We therefore still have concerns about the objectivity of the data used. We believe that the revised economic analysis does little to further the credibility of FWS.

The FWS and Secretary Lujan have stated that a consideration of effects on the economy will be made. The state has substantial data on Oregon's economy and, using our previous comments, we offered to provide data to FWS for the economic analysis. We were not asked, and the current economic analysis does not reflect the kind of analysis we think is necessary for FWS and the Secretary to make adequate decisions. We again extend our offer.

#### a. Methodology: benefits-costs analysis

FWS has not yet adequately responded to our concerns about the benefits-costs approach taken in its analysis. Stated simply, the benefits accruing to designation of critical habitat, such as improved water quality, biodiversity, and recreation gains, are long term and very difficult to quantify accurately. On the other hand, the costs, in terms of revenue lost to counties and lost jobs, are immediate and readily quantifiable. The benefits

analysis is still vague, open-ended, and difficult to apply to Oregon. Given the importance placed on benefits, this analysis should be much more accurate and directly relevant to Oregon conditions.

We restate our previous comments that the full array of costs associated with the designation of critical habitat needs to be displayed, while the full impact of job loss has not yet occurred, there has been economic impact associated with uncertainty in the industry. It is difficult to make new investments or pursue new products and markets, especially for small firms that, without federal timber supply, will cease operations in the near future. Many firms have been working for some time under conditions of extreme uncertainty.

#### b. Log exports and productivity gains

Log exports and productivity received a strong emphasis throughout the FWS report. Log exports from public lands are already prohibited. Although several private companies have voluntarily reduced log exports, by shifting critical habitat to public lands (federal and state), FWS has effectively locked up timber available to domestic manufacturers while freeing timber available for export.

There are substantial differences between Washington and Oregon on the impacts of log exports; these differences were not discussed adequately. Furthermore, reducing log exports will do little to help loggers. Given the attention devoted to log exports, these issues should have been included in the discussion. In summary, we do not consider that FWS has done sufficient analysis to suggest how reductions in log exports will significantly offset losses due to reductions in timber supply due to critical habitat.

The state is concerned about FWS's assertions about job losses due to mills investing in improved technology. This is a red herring. While there has been job loss due to the use of new technology, this does not mean that job loss from critical habitat is inconsequential. Rather, it means that the additional job loss from critical habitat will add to existing job loss in the industry due to productivity gains.

In order to remain competitive, firms are constantly searching for ways to increase productivity. Adoption of new technology is one way of increasing productivity, as are changes in management practices and the development of new products and markets. FWS did not discuss these latter strategies. Nor did FWS discuss other factors which could also affect industry behavior, such as international or domestic markets. If FWS is constructing an argument that other economic factors are contributing to job loss, a full analysis of these factors should be included.

Some timber mills have retooled and adopted new technologies, thereby increasing productivity. However, the main investment in mill technology occurred in the mid and late 1980's when markets were up and the supply outlook constant. It is unlikely given the uncertainty of markets, the chance of cheaper Canadian lumber imports, the reduction in timber supply, and the difficulty raising investment capital, that there will be the same level of investment in technology in the 1990's as there was in the 1980's.

Rather, with a large, skilled, unemployed labor force, much of it non-unionized, there could be considerable incentives for industry to replace capital with labor. This is of major concern to mill workers. FWS should address this issue in a more credible manner.

#### c. Industry structure

The forest products industry is not an homogenous industry. The impacts of timber supply decline will vary across sectors of the industry, with some areas affected more than others. Those firms reliant on old growth inputs will obviously be at a disadvantage compared to firms which are able to use second growth material.

Many small and medium-sized companies rely exclusively on federal timber, and it is these companies which do not own private lands that will be the most severely impacted. Large firms with private timber or a diversified portfolio will fare better than small firms reliant on federal timber and with little opportunity to invest elsewhere. Firms located near large urban areas are better off than those in small towns with few other alternatives.

All categories of primary wood products are operating at a much lower employment level than a year ago. In Oregon, 14 forest products mills employing 1,850 people, (nine sawmills and five veneer or plywood plants) closed in the first half of 1991 (Ehinger, 1991). An additional 37 plants, including 27 sawmills employing 1,750, operated part-time under curtailments during January to June. In 1990, 30 mills shut down during the year, the most since the 1980. Much of this loss has been concentrated at the level of smaller firms (Table 1).

Table 1: Number of employees in sawmills, plywood, veneer, and board plants that have ceased production since 1987 and are either liquidated or not currently producing.

Year	0-24	25-49	50-99	100-199	200+	Total
1991	1	(1)	(7)	2	2	14
1990	3	(4)	6	5	3	30
1989	(2)	(1)	1	(1)	1	11
1988	1	(3)	2	(1)	2	16
1987	1	(2)	1	(4)	1	11
Total	6	(8)	9	12	9	82

Note: 1. 1991 figures are for January-July only  
2. Average firm size in sawmills is about 500 workers  
3. Average size in plywood mills is about 1200-1300 workers

Source: Ehinger (1991).

As timber supply becomes tighter, it is likely that there will be substantial structural change in the industry.

#### d. Employment

While the overall job impact figures used by FWS appear reasonable, the indirect multiplier (total jobs/timber jobs) is too low. We suggest the FWS reexamine its multiplier (1.58) and seek further information from the Oregon Econometric Model used by the Oregon Executive Department for economic and revenue forecasting. Oregon uses a multiplier of 2.2.

Graph 1 shows levels of employment in the timber industry since 1980. Current employment in the timber industry is at the lowest rate since the recessionary years of the early 1980's. We anticipate that the rate of job loss will increase as current inventory is used up and timber supply tightens as existing sales are harvested.

However, it is not enough simply to look at aggregated unemployment figures. Work undertaken by the Employment Division, Oregon Department of Human Resources, demonstrates that aggregating employment impacts does not indicate the real impacts within the industry. The Employment Division has developed a skill transfer model for workers in the forest products industry (Ryals, 1990), and we draw your attention to this resource.



A logging job lost does not equal an engineering job lost in a mill because of the differences in skill levels of these two jobs and skill transferability to other jobs. For example, a logger seeking an entrepreneurial out-of-doors lifestyle, with little need of formal education, has less flexibility than a mill engineer who is used to working in a factory situation and is able to transfer engineering skills to other industrial operations. Similarly, jobs lost in small, rural areas away from major transport or urban areas are not comparable to jobs lost in larger areas near the I-5 corridor. With the emphasis now on federal timber in critical habitat, it is precisely those jobs in small rural towns which will disappear. The state is very concerned about the impact that the designation of critical habitat will have in small rural areas.

Again, the testimony at critical habitat hearings attested to the reality of this concern. FWS should recall testimony given by Douglas County where, for example, 60 percent of the entire Roseburg BLM District is now in critical habitat.

#### e. Impacts on Counties

Our earlier review of critical habitat requested an analysis of impacts to revenue-sharing for payments to counties and analysis of the local finance system including an estimate of impact on assessed private property. The only discussion of this appears buried in Appendix A. The three paragraphs headed "Other Economic Considerations" barely touch these subjects.

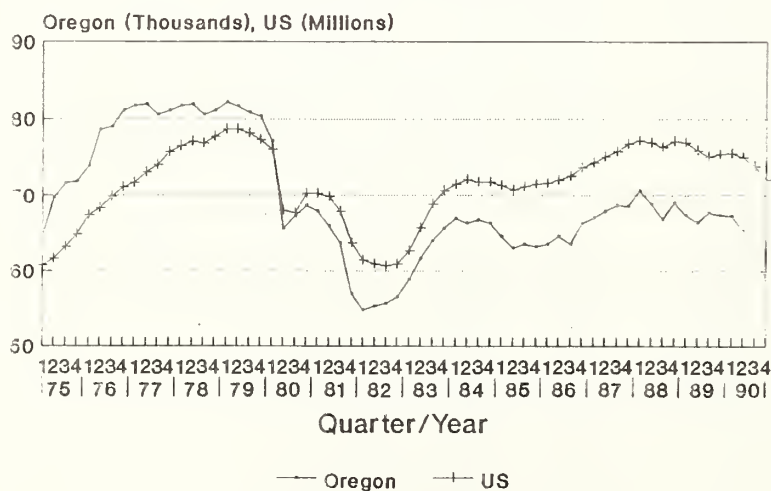
We refer you to a recently completed study of O&C counties (Lee et al., 1991) which discusses these impacts in some detail. We seek a thorough articulation and analysis of these impacts, including their full implications and interrelationships.

For example, declining forest products employment will affect property values. Using the FWS data provided in the "Economic Analysis of Designation of Critical Habitat for the Northern Spotted Owl", employment, relative to final plans, will decline by 5,278 in Douglas County. This decline will reduce assessed property values in Douglas County by \$204.9 million or 7.8 percent. Using the average tax rate that applied in 1989, property tax revenue will fall by \$4.8 million, a substantial impact for Douglas County. A full discussion of this analysis including its methodology can be found in Appendix 2.

The impact of critical habitat will vary from county to county. Of the three states with critical habitat, Oregon has the largest number of counties with a large percentage of jobs and wages in lumber and wood products. Those counties most likely to experience negative impacts from further reductions in log supply are: Coos, Douglas, Klamath, Lake and Linn (Huebner, 1991).

GRAPH I

## LUMBER AND WOOD PRODUCTS EMPLOYMENT (Sic 24)





These same counties are already experiencing high unemployment rates (Table 2).

**Table 2: Selected county unemployment rates**

County	Level of unemployment (May 1991)
Coos	8.4
Douglas	8.8
Klamath	8.7
Lake	9.1
Linn	7.8
State of Oregon	5.8

Source: State of Oregon, Employment Division, Department of Human Resources (1991).

As indicated by Table 3, there is a substantial reliance by counties on federal timber receipts; in particular, Douglas, Lane, Jackson, Klamath, and Josephine. Reductions to counties will result in fewer services, and this reduction will occur at a time when there will be increased pressure for social welfare services.

**Table 3: County Revenue from FS and BLM**

County	Receipts from national forests and BLM (O&C) FY 1990
Baker	\$ 1,566,687
Benton	3,240,084
Clackamas	11,850,623
Columbia	2,126,509
Coos	6,708,683
Crook	3,640,527
Curry	8,435,449
Deschutes	4,175,756
Douglas	50,137,208
Grant	10,810,104
Harney	4,318,697
Hood River	2,542,447
Jackson	20,708,207
Jefferson	748,815
Josephine	14,988,491
Klamath	15,716,080
Lake	6,191,279
Lane	45,265,442
Lincoln	1,941,827
Linn	12,850,452

12

Malheur	11,199
Marion	5,271,742
Morrow	432,619
Multnomah	2,012,964
Polk	2,236,355
Tillamook	2,495,159
Umatilla	1,181,512
Union	1,317,546
Walla	2,328,159
Wasco	2,523,439
Washington	650,340
Wheeler	1,202,227
Yamhill	1,273,820
TOTAL	\$252,900,458

Source: Northwest Forestry Association.

For Oregon these impacts occur at a time when counties are facing declines in revenue from Ballot Measure 5. The designation of critical habitat is placing an additional burden on an already overloaded system.

#### f. Mining and mineral exploration

The state considers it important that the economic impacts of non-timber activities be built into the economic analysis. This includes secondary forest products such as mushrooms, floral greens, etc., and recreation and minerals.

Mineral activities and potential probably amounts to tens of millions of dollars, and mineral development could help to diversify local economies. FWS does not adequately explain the potential for mineral resources in critical habitat. As we discussed in our earlier comments, the economic analysis must be expanded to include a balanced, complete, and accurate determination of all mineral-related economic impacts.

There could be widespread mineral resources of energy and hard minerals throughout the critical habitat region. This includes tens of millions of dollars of past, present, and future mineral production. There has historically been oil and gas leasing and exploration activity in many of the areas proposed for owl habitat designation. For example, the Oregon Department of Geology and Mineral Industries (DOGAMI) is conducting an extensive study of the Tyee Basin in Douglas and Coos counties to look at hydrocarbon potential. Critical habitat exists in this area.

The Economic Analysis contained only a short section on minerals and concentrated on the Medford 1'x2' Quadrangle, but there are

13

references relating to other areas of critical habitat that could also have been used. We draw your attention to Diggle et al. (1990) as one such reference. In addition, more emphasis should be placed on computerized data bases of mineral information such as the DOGAMI Mineral Information Layer for Oregon (MILCO).

#### 6. Social impacts

The state is very concerned that, despite extensive public comment during the first public comment period, documenting the social impacts of critical habitat, no social analysis has been undertaken. There is no justification for omitting an analysis of social effects, especially since FWS saw fit to analyze other not easily quantifiable areas.

A social analysis is crucial to an understanding of the true costs of protecting the owl. We draw the FWS to the hours of public comment from affected timber workers and their families. This testimony points to the anger, desperation, grief, and sense of hopelessness that many forest products workers feel.

FWS should read the study carried out for the O&C counties by Lee et al. (1991) which estimated revenue impacts from reductions in federal revenues to O&C counties and evaluated the social impacts of declines in services. According to this study, "reductions in federal harvesting will substantially impair the capacity of... counties to provide services at a time when economic dislocation will cause a sharp increase in needs for local services."

FWS must acknowledge the human suffering already occurring, and anticipated to occur, because of its actions.

#### 7. Analysis at a local level

In our previous comments we pointed out that economic and social impacts will be highly variable. Because of this variability, it is crucial that local impacts be examined in detail.

Also in our comments we included a study of those areas in the state most impacted by timber supply reductions. Analysis of social impacts in these communities should be undertaken. Gates-Mill City are two highly timber-dependent communities located in the Santiam Canyon east of Salem, Oregon. The Canyon has in the past relied heavily on timber provided by the nearby Willamette National Forest and the Salem District Bureau of Land Management lands. Critical habitat (Areas 0-4, 0-5, 0-6) is located to the north, south, and east.

In Gates and Mill City, employment in the forest products industry declined by 12 percent, from 473 to 418 between January 1990 and

January 1991. For the same time period, total employment declined 9 percent from 873 to 795. Mills in the area are experiencing severe shortages of supply and at least one mill has bought timber from the east-side of the state, involving increased transportation costs -- and causing increased competition with east-side mills.

The Canyon Crisis Center, which serves the entire Santiam Canyon area, provides a range of services to men and women in need. Cheryl Girod, Director of the Center, and long-time resident of Mill City, has noticed an increase in the use of the Center over the last year (Table 4).

Table 4: Canyon Crisis Center Usage - Selected groups

Case/Load category	1990	Jan-Mar 1991
Domestic violence	166	210
Child assaults	89	181

Source: Girod (1991).

It is difficult to compare these figures. The increases may partly be explained by the fact that new people have moved into the community and the Crisis Center has become more well known. However, Girod, a long-time resident of Mill City, says she notices a difference in the types of people coming in for assistance. She believes that these changes reflect changes in the timber industry.

Timber families that until now have relied on the resources of the extended family are now coming in for services. According to Girod, for these families to come into the Center, things have to be very bad. However, they are now starting to come to the Center for help. "I couldn't believe what they were losing, their homes, their credit, log trucks, their cars....," said Girod. For Shawn Morsford, an Extension Officer based at Mill City, the entire community is grieving.

#### 8. Cumulative impacts

The State of Oregon appreciates the response by the FWS to our previous comments in displaying the reductions in ASQ in increments related to the implementation of the ISC plan, listing the spotted owl, and designation of critical habitat. By doing this, one begins to get a picture of the cumulative impacts of these events. However, the state is still concerned that the full picture is not presented.

Graph 2 shows that the average ASQ in Oregon between 1983-1987 from federal lands was 4.3 mm/bf, that the Forest Service plans dropped

this to 3.0 mmbf, ISC reduced it to 1.9 mmbf, listing of the owl to 1.6 mmbf, and critical habitat to 1.5 mmbf. All cuts apart from critical habitat stand by themselves. Critical habitat includes some of the other elements (part of the ISC, part of forest plans), but not all. Critical habitat does not include the 50-11-40 rule. The critical habitat designation reduces the 1983-87 harvest levels by 65 percent.

The reality is that because of lawsuits, appeals, and pending sale reviews the amount of timber actually offered for sale is very small. For example, for the 1991 fiscal year, the Forest Service only sold about a third of its target sales. BLM sold just over half of its target sales. Therefore, regardless of the planned reductions in ASQ, there have already been real reductions in sales.

In 1990 the Forest Service received 1,154 appeals on 585 timber sales across the country. These appeals were directed at sales leading to \$195 million in federal taxes and \$179 million in revenues for timber-dependent counties. The Forest Service has spent more than \$59.4 million since 1984 processing all administrative appeals on timber sales.

It is crucial for decision-makers and the public to fully understand the full range of change in ASQ which has occurred and over what time period. Two effects are occurring:

i) The industry is currently experiencing a high level of uncertainty. This translates into reduced commitment and ability to improve efficiency. Financial institutions are unwilling to lend money to timber companies whose economic future is uncertain. This severely limits company decision-making ability.

ii) When additional timber reductions kick in during the next year or so, companies reliant on federal timber will experience severe problems.

We would like to see decisions on timber supply resolved quickly and cleanly to address these two problems. We would also like to see harvest reductions phased in gradually to allow industry time to adjust to reductions in timber supply.

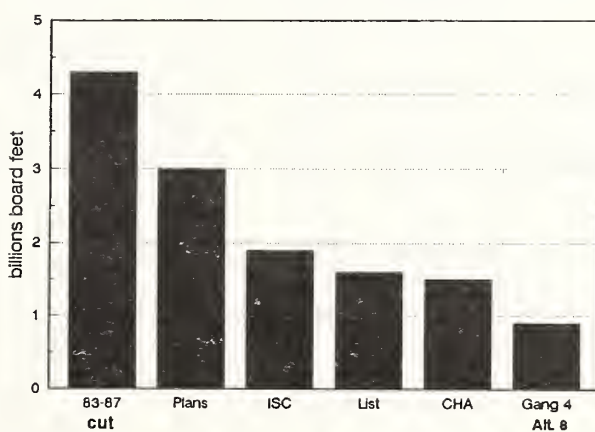
In addition, we would like to know who gets to do the analysis of the cumulative impacts. Under NEPA, these matters would be addressed. However, FWS has categorically stated that NEPA does not apply and no Environmental Impact Statement is required.

#### B. Requirement for Balancing

After private lands were removed from critical habitat, FWS added some federal lands back into critical habitat. For some forests

Graph 2

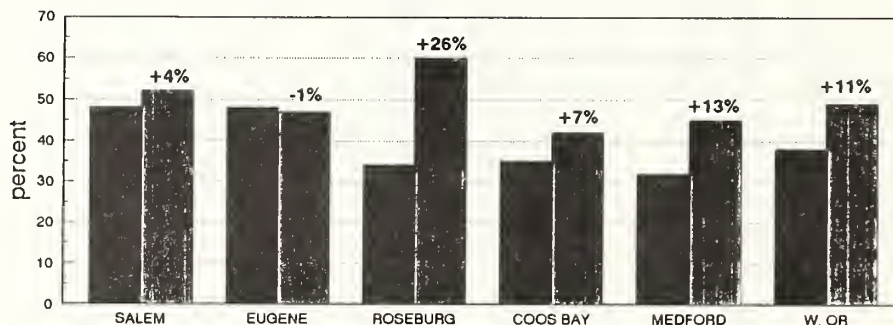
### ASQ CHANGES DUE TO SPOTTED OWL



CHA - critical habitat area

GRAPH 3

# SPOTTED OWL HABITAT PLAN COMPARISON FOR BLM % blm land placed in CHUs compared to CHAs



BLM western Oregon districts

CHA -- critical habitat areas  
CHU -- critical habitat units

■ CHA ■ CHU

the impacts of these add-backs are significant. For example: Graphs 3 and 4 show the impacts on BLM and Forest Service lands in Oregon.

It appears that the old growth add-backs were done without taking into account any impacts on local communities. It appears that no balancing has been done, even though such balancing is clearly permissible under the Act's provisions for critical habitat designation. Looking at the FWS schedule for the next months, it does not appear that there is any time to undertake the balancing required under the law.

We believe that the following needs to be taken into account in this exercise:

- i) more realistic assumptions of risk for the owl.
- ii) increased emphasis on the economic impacts for timber-dependent communities and workers.
- iii) permitted activities in critical habitat - FWS needs to show what activities are helpful to owls; for example, anecdotal information suggests some activities can be helpful, or neutral, to the owl; such as commercial thinning, removal of some old growth at an appropriate time of year, smaller clearcuts, and new forestry techniques taking into account overall biodiversity.

FWS needs to examine closely policy which would permit some timber sales to proceed based on minimum adverse impact to the owl and maximum positive impact to local economies. Timber supply is not equally distributed and some areas could be cut with lower impacts to owls than others.

In finding solutions to recovery of the spotted owl, it is important to include scientific input from a range of disciplines. Wildlife biologists, ecologists, and silviculturalists point out that much could be tested to adapt timber harvest practices to improve habitat.

The state believes that there are creative solutions to improving conditions for the owl that involve forestland management, including some timber harvest. These alternatives need a thorough examination. By endorsing the use of these techniques, more could be done to mitigate the adverse economic impacts while further information is gathered about the number of owls, their presence and adaptation to various habitats, and their response to various land management practices. We also suggest FWS examine work carried out by the Recovery Team to examine creative techniques and practices relative to the management of the owl that would provide increased chances of survival for the owl.



We do not believe it is in the public interest for the FWS to just look at the economic and social impacts of the small increment of ASQ resulting from critical habitat. The proposed rules assume that reductions in ASQ have already taken place due to implementation of the ISC. This is erroneous; the ISC has not been implemented. It has been adopted by the USFS (but not BLM), but the USFS is under court order to come up with a new EIS on its standards and guides, and it will undoubtedly have to revise the plans.

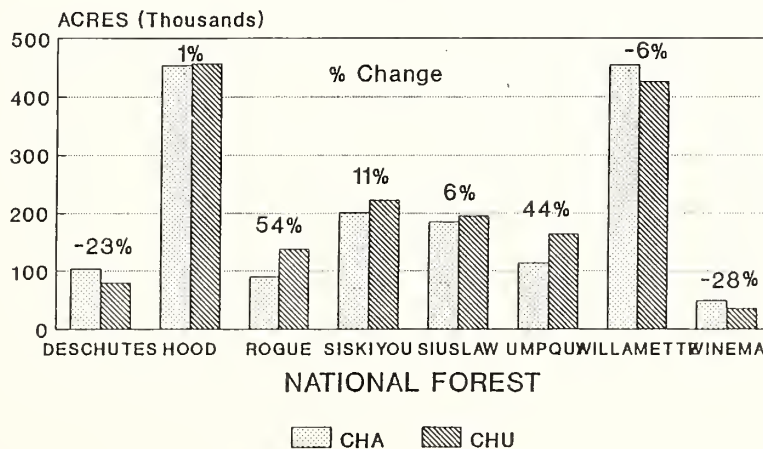
Also it is not clear what basis FWS has for the reductions merely for the listing. In general, it appears that FWS wants to make it seem that the act of proposing critical habitat rules is by itself insignificant because all the other reductions have already occurred. These other actions are still undergoing decisions, and even though the FWS does not control decisions on these other actions, it should be accountable for the analysis of the cumulative impacts.

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- Girod, C. 1991 Unpublished data, Canyon Crisis Center, Mill City.
- Huebner, A. E. 1991 Demographic trends in California, Oregon, and Washington counties with northern spotted owl populations/habitat, USDA Forest Service, Washington, DC.
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GRAPH 4

## SPOTTED OWL HABITAT PLAN COMPARISON FOR USFS Unsuitable Acres





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Appendix L-C  
**List of Respondents**





## **C. List of Respondents**

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### **Elected Officials and Federal Agencies**

Congressman Riggs' Office  
Department of Energy, BPA  
Director, U.S. Dept. of Interior  
Environmental Protection Agency

Office of Rep. Jim Mcdermott  
U.S. House of Representatives  
USDA, Soil Conservation Service

### **State Elected Officials and Agencies**

Rep. Cedric Hayden  
Senator Tim Leslie  
Honorable Bill Markam

Honorable Barbara Roberts  
Cong. William Dannemeyer's Office  
The Resources Agency of California

### **County, City, Local Government and Elected Officials, and Schools**

Board of Supervisors, Shasta Cnty.  
City of Weed  
Clallam Cnty. Econ. Dev. Council  
Clallam County  
Coos County Commissioner  
County of Siskiyou  
Curry County Commissioner  
Douglas County Commissioner  
Humboldt County Supervisor  
Josephine County Oregon Courthouse

Linn County Commissioner  
Marion County Commissioner  
Mayor Pro-Tem City of Weed  
Polk County Commissioner  
Shasta County  
Shasta County Office of Education  
Siskiyou Cnty. Board of Supervisors  
Siskiyou County  
Trinity County Supervisor

### **American Indian Organizations**

Yakima Indian Nation

## *List of Respondents*

## **Businesses**

A.J. Cloninger Jr. Trucking, Inc.  
Acme Glass Co., Inc.  
Aerial Forest Mgmt. Foundation  
Albert Kegley Trucking  
Alice's Restaurant  
Allen Logging Co.  
Aubertin Logging & Lumber  
Bohemia Mine Owners Association  
Boise Cascade - Timber Products Div  
Britt Bros. Trucking, Inc.  
Brooks Manufacturing Co.  
Burney Forest Products  
Byron Bros., Inc.  
Champion Intl. Corp.  
Columbia Plywood Corporation  
Commencement Underwriters  
Crossroad Auto & Truck Parts, Inc.  
Dean Nasley Trucking  
Delson Lumber  
Don Anhart Hauling, Inc.  
Eagle Rock Inc.  
Early Winters Resort  
Ed Rongey Trucking  
Ellingson Lumber Co.  
Erickson Air-Crane Co  
Fereres Lumber Company, Inc.  
Fort Vancouver Plywood  
Fred Atwood Contracting  
Frontier Hotel & Trailer Park  
Furman Lumber Company, Inc.  
Goodyear Nelson Hardwood Lumber Co.  
Grant Logging Co., Inc.  
Hi-Ridge Lumber Co.  
Hoh River Timber, Inc.  
International Paper Company  
Intn'l Paper - Gardiner Paper Mill  
J & A Cutting, Inc.  
James River Corporation  
Janicki Logging Co. Inc.  
Joe Martin Logging & Trucking  
John E. Sanders Trucking  
Kysar Tree Farm Management  
L & L Timber, Inc.  
La Grande Industrial Dev. Corp.

Lance Forest Products  
Lance Fope Trucking  
Lewis L. Pickner Jr. Trucking  
Little Foot Expeditions  
Loren Johnson Log., Inc.  
Mac Rental Crp.  
Magic Valley Trail Machine Assn.  
Matson And Isom Accountancy Corp.  
Norcal Electric Supply, Inc.  
Oliver Contruction, Inc.  
Olympic Cascade Timber, Inc.  
Pat & Mike Trucking  
Patton Logging  
Permapost Products Co.  
Peterson Pacific Corp.  
Peterson Tractor Co.  
R.G.S. Contracting  
R.J. & S.F. Gross Trucking  
Rodenbough Logging  
Ron Wetzel Trucking  
Rose Logging  
Russ Cornett - Trucking  
Schaller Forest Products  
Sholes Logging, Inc.  
Sierra Pacific Fund  
Simpson Door Company  
Snell Logging, Inc.  
Stevenson Co-Ply, Inc.  
Swearingen Logging  
The Confectionery  
Timberline Air Service, Inc.  
Unocal Geothermal Division  
Valley Pharmacy  
Van Matre's Store  
Western States Trade Lines  
Western Wood Preservers Institute  
Weyerhaeuser, Vice President  
Willamette Industries, Inc  
Wright & Sons, Inc.  
WTA-LTC  
Zane Kelly Trucking Co.  
Zarosinski Industries, Inc.  
Zwight Logging Co. Inc.

## **Interest Groups**

Alaska Forest Association	Northcoast Enviromental Center
Alpine Lakes Protection Society	Northern Humboldt Pomona Grange #48
American Motorcyclist Association	Northwest Environmental Advocates
American Timberman & Trucker	Northwest Forestry Association
Associated Oregon Loggers	Northwest Independent Forest Man.
Audubon Society of Portland	NW Forest Resource Council
Avison Lumber Company	NW Independent Forest Manufacturers
Black Hills Audubon/IITC	Oregon Equestrian Trails
Blue Ribbon Coalition, Inc.	Oregon Hunter's Association
C/O Citizen's Review	Oregon Lands Coalition
California Assoc. of 4WD Clubs	Oregon Natural Resources Council
California Forestry Association	Peace of Eden Sanctuary Divine Heal
California State Grange	Pilchuck Audubon Society
California Women In Timber	Quilcene Ancient Forest Coalition
Cape Arago Audubon Society	Redwood Region Economic Dev. Comm.
Cathedral Forest Action Group	Santiam Wilderness Committee
CGO, OLC	Share-Shasta Alliance for Resources
Citizens for Better Forestry	Shasta Alliance for Resources & Env
Clover Logging	Shasta Builder's Exchange
Communities for A Great Oregon	Sierra Club Legal Defense Fund, Inc
Economic Development Corp.	Sierra Club No. CA/NV Field Office
Environmental Defense Fund	Sierra Club, Redwood Chapter
Environmental Protection Info.	Siuslaw Soil & Water Conservation
Federation of Western Outdoor Clubs	Siuslaw Timber Operators Assn.
Forest Conservation Association	Society of American Foresters
Forest Matters	Southern Oregon Alliance for Resour
Freshwater Grange #499	Southern Willamette Earth First
Greater Ecosystem Alliance	SREP & Siskiyou Audubon
Green World International Park Coa	T.R.E.E.S.
Hayford Economic Alliance	United Paperworkers Intn'l Union
Headwaters	WA Commercial Forest Action Comm
I.W.U. Local 3433	WA. Lands Coalition
Kare President, S.O.S. President	Wash. St. Licensing Beverage Assoc.
Klamath/Siskiyou Coalition	Washington Contract Loggers Assoc.
Lane County Audubon Society	Washington Lands Coalition
Loggers World	West Valley Citizens for Timber
Marble Mountain Audubon Society	Wilderness Society
Mary's Peak Alliance	Wildlife Society
Mazamas Conservation Committee	Wildlife Society, Oregon Chptr.
Mendocino Environmental Center	Willets Environmental Center
Molalla Timber Action Committee	Wind River Adopt-A-Forest
National Audubon Society West. Reg.	Wintu Audubon Society
National Wildlife Federation	WNEI - WNETT
Native Plant Society	

## *List of Respondents*

## **List of Individual Respondents**

George Abbott  
J. R. Abdill  
Judy Abdill  
Michele M. Acker  
Dale Ackeret  
Darrell Adais  
Zane Adam  
Donna J. Adams  
Everett K. Adams  
Everett K. Adams, Jr.  
Orville E. Adams  
Deborah Addis  
Robert Addis  
J. Aden  
Rodney Ader  
Mike Aeree  
Bob Agee  
Bruce Agee  
Debbie Agee  
Melvin Agee  
Pat Agee  
Rona Agee  
Ronald Agee  
Will Agee  
Willas Agee  
Alan Ahlberg  
Paul Ahrlison  
Larry L. Aichele  
Mary Lou Aiduy  
Richard C. Aiduy  
Jack Aioto  
Steven D. Akehurst  
Dana L. Akers  
Gerald W. Akin  
Franklin S. Akins  
Jerri Akins  
Robert Alanhinkin  
Gayland Albertson  
Arnold J. Albrecht  
Maurice Alden  
Craig E. Alder  
Robert J. Ales  
Clayton Alexander  
Kim Alexander  
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Glen Carnes  
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Steve Collins	Philip L. Cox
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Derek Evins  
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Don Exon  
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Dan Faas  
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E. Kay Faas  
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Jack Faas  
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Katy Faas  
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Lora Faas  
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Mickel Faas  
Nickolas Faas  
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Shona Faas  
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James Fletcher  
Mike Fletcher  
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Roger Foster  
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T. Harvey  
Tommy Haskind  
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Mike Henry	Kimberly L. Hiscott
Zack Henry	George E. Hise
Jerry Henson	Warren Hitterly
Steve Henson	Elizabeth Hoaglen
Tim Herd	Jack Hoaglen
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Josh Hernandez	Kelly Hockett
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John Hickey	Alan Holden
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Jack Howard  
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Leland Humphreys	L. H. Jacobson
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John Hundly	Harold James
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Kevin Hurd	Jim Jarvis
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Bret Hurt	Kevin Jenkins
Cliff Hutchins	Nadine Jenkins
Robert Hutchins	Rob Jenks
S. Hutchins	Barbara K. Jennson
Shirley Hutchins	Karyl J. Jensen
Jerry Hutchinson	Maren Jensen
Evelyn Huuki	Robert Jensen
Emily Hwaung	Warren Jensen
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James E. Hyatt	Jim D. Jeppson
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Larry Iles	Velma Jewell
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Mike Immoos	Aimon Jitenburo
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John A. Johnson  
Katherine Johnson & David MacFarlan  
Loren Johnson  
Lori Johnson  
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Robert N. Johnson  
Ron Johnson  
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Stain A. Johnson  
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Tom Johnson  
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Tracy L. Johnson  
Wallace J. Johnson  
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Jerry Johnston  
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W. R. Johnston  
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Aaron Jones  
Becky S. Jones  
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Curt Jones  
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Jim D. Jones  
Lynn Jones  
Mary Jones  
Norma M. Jones  
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Harold D. Kennedy  
Jim Kennedy  
Kenneth E. Kennedy  
Larry Kennison  
Grace H. Kensley  
Lavon Lowe Kent  
Larry Kentta  
Michael F. Kenworth  
Ginger Kern  
Jason Kern  
Frank Kerns  
Loyel Kerr  
Aileen Kesler  
Mike Kesner  
Louis Kevitt  
Paul F. Keye  
Paul Kidney  
David D. Kieft  
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Dan Knox  
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Robbin & Angeline Lacy  
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Eugene Laiho  
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Christina Lambert  
Cody L. Lambert  
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Sandra Langlois  
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## *List of Respondents*

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Lawrence Lee  
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Jeffrey Leigh  
Glenn T. Leighton  
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Curtis Lient  
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Tom Lindeleif  
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Bruce Marshall  
George Marshall  
John Marshall  
Lyle Marshall  
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Elva McElrath  
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Robert Melton	John Miller
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Fred Morgan  
Gayle L. Morgan  
Gayle P. Morgan  
J. Corey Morgan  
Jerry J. Morgan  
Jerry R. Morgan  
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Raymond Morgan  
Sam Morgan

Susan Morgan  
Wayne Morgan  
Z. Starlene Morgan  
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Ray Morgel  
Alma Morin  
Eldon Morin  
Ivan Morin  
Paul E. Morin  
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Talana L. Morin  
Tami L. Morin  
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## *List of Respondents*

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Richard Munoy	Max E. Neff
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Jeff Munson	John B. Nehf
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Daniel Murphy	Hank L. Nelson
Florence Murphy	J. Nelson
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Shirley J. Murphy	K. R. Nelson
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June Navarro	Corey Nichols
Rick Navarro	Gary Nichols
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Sid A. Norwood  
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Toby Pires  
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Ray Porter	Dean Pugh
Philip Porush	Roger Pulhman
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Rick Posekany	Robert E. Pullen
Johny Posey	Linda Pulliman
Johny Posey	Eric Pulver
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Brett A. Potter	Lori Putrey
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Steve Potwin	Scott Quast
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Mark D. Powell	Loyd Quimby
Raphael E. Powell	Joey Quintana
Treva L. Powell	Jack S. Radabaugh
Myrtle Powers	Bill Radley
Bob Powne	Randy Raggon
Bob Powne	Francisco Raigosa
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Abbey Rapp  
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William Rasband  
Terry Rasmussen  
Donald W. Rasor  
Phil Rasor  
Norm Ratbuck  
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Dan Rath  
Kathy A. Rathbun  
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Rodney V. Ray  
Dow Rayborn  
John Raymond  
Kenneth H. Raymond  
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Lawrence Redding  
Respondent  
Jacob Reed  
R. Reed  
Rhonda Reed  
Marcier Rees  
Steven J. Regelin  
Micheal Reid  
Michael D. Reimer  
Naomi R. Reimer  
A. Troy Reinhart  
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Randall A. Reinhart  
Troy Reinhart  
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Rick Reiting  
R. Remington  
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Joseph M. Remius  
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Mily Renfro  
Wesley Repp  
Randy Rettke  
Dennis Reyeon  
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Robert L. Rice  
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Earl Richardson  
Jeff Richardson  
Jill M. Richardson  
Joey Richardson  
Larry Richardson  
Linda Richardson  
Robert W. Richardson  
Steve Richardson  
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Michael S. Rickert  
Valerie Rickert  
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Bruce Rider  
Gene Rider  
Monda Rider  
Sharlotte Rider  
Brian Riecke  
Melisa Riesterer  
Rick Riesterer  
Vic Riesterer  
Cliff Riggs  
Curtis Riggs  
Marlyn A. Riggs  
Robert C. Rightbower, Jr.  
John Rigley  
Butch Rigril  
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Larry B. Riley

### *List of Respondents*

Wesley S. Riley	Tom S. Rochefort
Tamra Rin	Pat Rodewald
David R. Ring	A. G. Rodgers
David R. Ring, II	Bill Rodgers
Gwinn Ring	Bob W. Rodgers
Jeanne Ring	Burl Rodgers
Kevin Ring	Dave Rodman
Linda Ring	Ellen Rodriguez
Lourie Rinkle	Juan Rodriquez
Jack Ripper	Michael R. Roe
John E. Rist	Tameron Roe
Ronald A. Ritchie	Roger L. Roebuck
Curtis J. Ritter, II	Mary Roehrich
Joyce K. Ritter	Oliver Roesler
Sam, Jo & J. Roark	Larry J. Roffener
Bev Roash	Steven Rogel
David W. Robbins	Bonnie Rogers
Kristen Robbins	Brian J. Rogers
Patricia Robbins	Bruce W. Rogers
Travis Robbins	Chris Rogers
Amy Roberts	Donna M. Rogers
Cari Roberts	Janice Rogers
Charles P. Roberts	Jared C. Rogers
Claves Roberts	Joseph E. Rogers
Dale J. Roberts	Lee Rogers
E. N. Roberts	Mareli Rogers
Elmer & Betty Roberts	Richard Rogers
Erik Roberts	Walter Rogers
Ethel Roberts	Clark Rogerson
Everett R. Roberts	Richard E. Rohr
Georgia J. Roberts	Louis Rolinett
Jerry Roberts	John Rollin
Jimmy D. Roberts	Alejandro Roman
John A. Roberts	Joel Roman
Kimberly D. Roberts	Laura Roman
Richard Roberts	Maricela Roman-Valdez
Stan Roberts	Jerry L. Romano
Wes Roberts	Allen D. Romero
Claudia Robertson	Robin J. Ronan
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Velma Robertson	Sazette Ronco
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Shalina Robinson	Steve W. Roosa
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Steve Robinson	Charles E. Rose
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Ernie Ruhl  
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M. Gene Runion  
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Dale Russell  
Daryl Russell  
David Russell  
Dawn Russell  
Debra Russell  
Marlene Russell  
Rick A. Russell  
Ryan Russell  
S. L. Russell  
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Chuck Ruth  
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Jeffrey Rutherford  
Michael D. Rutledge  
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Don Ryan  
Randy Sabo  
Paul Sagner  
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Paul Schindler  
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Larry R. Schmick  
Bruce Schmid  
Bob Schmidt  
Brenda Schmidt  
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Gene Schmidt  
John P. Schmidt  
Jurgen K. Schmidt  
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Tobias D. Schofield  
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Sharon Schoonhoven  
Sarah Schonhover  
Steve Schoradt  
L. P. Schrieber  
Walter Schroder  
Jim Schroeder  
Valrye Schuler  
Kelly D. Schultz  
Ralph Schultz  
William Schultz  
Valerie D. Schupbach  
Carl H. Schwarzenberg  
Craig Scott  
Jennifer Scott  
Karen R. Scott  
R. Scott  
Richard L. Scott  
Robert E. Scott  
Robert G. Scott  
Ries Van Scoy  
Randy Scruggs  
Verl Dale Searcy  
Kerry Searles  
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Darrel R. Seiber  
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Charles W. Selden, III  
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Hay Shanks  
Vicki Shanor  
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Barbara H. Shaw  
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Arthur H. Sheer  
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Marcia Sheffield  
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David C. Shelton  
Eugene Shelton  
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Steve Simpson  
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Mike D. Sims  
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Justin L. Skinner  
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Dana Smart  
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Keith Smart  
Richard Smart  
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A. Smith  
Albert D. Smith  
Albert Smith  
B. E. Smith  
Calvin Smith  
Cecil E. Smith  
Cindy Smith  
Connie Smith  
Dan Smith  
Darlene Smith  
Dave Smith  
Don Smith  
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Edward Smith  
G. L. Smith  
Gary V. Smith  
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J. Smith  
Jack B. Smith  
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Leslie Smith	Nora Sonne
Mark Smith	Gerald E. Sorbel
Michael A. Smith	Susan Souder
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Pamela Smith	Leonard A. South
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Richard & Stacie Smith	Jason Spadaro
Richard Smith	Ken Spahn
Rodd A. Smith	Erica L. Spain
Ron Smith	E. R. Spangler
Sherry E. Smith	Randy Sparfella
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Tom Smith	Mark D. Spores
Tracie Smith	Richard Spotts
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Walter Smith	John Spring
William Smith	Mildred Spring
Randy Smithy	Richard & Susan Spring
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Samantha Sneed	Beverly Springer
Barbara Snell	James F. Springer
Michael D. Snell	Thad Springer
Robert W. Snider	Donna Sprouse
Gary Snook	Terry Sprouse
Gene B. Snook	Betty Spurlin
Larry C. Snook	Sqeekey
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Dan Snyder	Fred Stalen
James Snyder	Jean Stam
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Todd Snyder	Greg Standley
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Donna Steadman  
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Lori Steele  
Marty J. Steele  
Ruth Steele  
Joel Stefam  
Linda Stefanich  
Mary Lee Steffensen  
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Cheryl Steinbring  
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Earl R. Stephens  
Kathy Stephens  
Lawrence Stephens  
Mike Stephens  
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Mark Stevens  
Charles E. Stevenson  
Rick Stevenson  
Bruce R. Stevenson  
Richard A. Steward  
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F. H. Stewart  
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Janet Stewart  
Lucille Stewart  
Marie M. Stewart  
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Harold R. Stitzel  
Pam Stitzel  
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Gilda Stone  
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Josef P. Stoneburg  
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Walburga Stringer  
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### *List of Respondents*

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Randy Sylvester	John Thomas
Gerald Taal	John Thomas, Jr.
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Doanld D. Tanfenani	Richard M. Thomas
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Marsha Tatom	David Thompson
Travis Tatton	Delane Thompson
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Gary Taylor	Donnie D. Thompson
Gene Taylor	Gene Thompson
J. B. Taylor	Janice Thompson
John Taylor	Keith D. Thompson
Lauren M. Taylor	Kentina Thompson
Margaret Taylor	Kevin Thompson
Marshal Taylor	M. Thompson
Matthew Taylor	Marilyn S. Thompson
R. L. Taylor	Mark Thompson
Robert R. Taylor	Robert E. Thompson
Terry Taylor	Sue Thompson
Tim Taylor	T. A. Thompson
Charles Teague	Tina Thompson
Arlan J. Teie	Tom Thompson
Harry Teilmann	Wendell J. Thompson
James L. Tellier	Willie Thompson
Ken Telschow	Virginia Thompson-Taylor
Linda Tenney	Donald W. Thomson
Richard Terry	Jan Thomson
Verne Terwilliger	Judy D. Thomson
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Robert R. Thayer	Raymond Thorp
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Billie R. Tinker	Oscar Tufts
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Teri Tinker	Dan Turin
Traci Tinker	Donald W. Turnbough
Vernon L. Tinker	Jean Turnbough
Doug Tippet	Homer Turnbull
Jamie Tippet	Roger Turnbull
Kay Tira	Doris L. Turner
Jon Titus	Michael Turner
Frank A. Tobey	Tom Turner
Ailene Todd	William D. Turner
Richard B. Toepper	Clifford M. Tuttle
Dianne Toleno	Judy Tuttle
Jim Tollefson	Kenneth Tuttle
Judith G. Tollefson	Doral Twigger
Marvin Tollet	John P. Tye
Bob Tomheim	Larry S. Ulbricht
Teri Tompkins	Sherry Ulin
Roger Tompohs	William S. Ulin
Pat Tone	Juan J. Ulma
Stephen E. Torgesen	Ed Underwood
Anastacio Torres	Jerry Underwood
Deryl Towner	Paul Underwood
D. Toye	Susan E. Urager
Don Trahan	Paul E. Utter
Linda Trahan	Duane Vaagen
Joe Trahar	Richard Vandenburg
Tom Trammel	Don D. Vahl
Ben Trapp	Cynthia Van Buren
Tammy Trapp	Ron Van Cleave
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James Tremble	Ron Van Handel
Curtis Trent	Clyde E. Van Orien
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Mickey Vanicut	Shad C. Walker
Bob Vannorman	Teresa Walker
Mark W. Vannoy	Tony Walker
Donna Vanosten	Traci Walker
M. C. Vanoster	Edward C. Wall
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Charles L. Varner	Bob Wallace
Charles Vaughan	Carol Wallace
Shirley M. Vaughan	Denver Wallace
Amy Vaughn	Dwayne E. Wallace
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Deana Vincent	Irvin H. Walsh
Mitch Vincent	T. Waltenspie
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Roger Vogelpohl	Liz Walter
Matt E. Volk	Ron Walter
Leslie Voorhays	Mel Walters
Arthur T. Vosburg	Dallas Walton
Julie Voss	Patty Walton
Bernie Vottek	Bob Waltz
James A. Voytek	John C. Wand
Robert J. Voytek	Michelle Wandke
Dennis P. Vroman	Cecilia Ward
Audra B. Wacaster	Don Ward
Wallace Wacker	Donna Ward
Donald S. Waddell	Gerville Ward
Richard S. Waddle	James D. Ward
Gary L. Wagar	Karl Ward
Chris L. Wagenman	Lila Ward
Bill Waggoner	Robert Ward
Douglas G. Waggoner	Stacey Ward
J. M. Waggoner	Tim Wardwell
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Douglas J. Waits	Kevin Wareham
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John Waldron	Vance Warner



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Ginger & Dwight Wartenbee  
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Andrea Sue Watson  
Bill Watson  
L. A. Watson  
Robert P. Watson  
Robert S. Watson  
Tim Watson  
Frank Watts  
Robert Waugh  
James Way  
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Terry Weakley  
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Gay L. Weaver  
Jolynn Weaver  
Ken Weaver  
Randy Lee Weaver  
Stacie Weaver  
Grover C. Webb  
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Steve Webb  
Steve Webb  
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Mike Webberley  
Shanna F. Webberley  
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Avann Weber  
John P. Weber  
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Richard A. Webster  
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Bert Weekly  
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Jennifer Weeks  
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J. Weiler  
John J. Weiler  
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Chris Weinhold  
Barbara Weinstein  
Arthur Weise  
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Brett Welch  
William R. Welch  
Tom Welker  
Don Wells  
Donald V. Wells  
Gladys Wells  
James D. Welsh  
David Welt  
John Weltes  
Michael T. Welton  
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Curtis J. Welty  
Tamara K. Welty  
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Gale Westbrooks  
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Siegfried Wertt  
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Liz Wharton  
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Donald Whisenhunt	Sharon Wilbanks
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Al Whitaker	Daniel E. Wilcox
Cindy Whitaker	Frank Wilcox
David Whitaker	Lynda Wilcox
Don Whitaker	Roy Wilcox
Gene Whitaker	Carl R. Wiley
Janet Whitaker	G. Wilkes
Keith Whitaker	Faith I. Wilkinson
Pat Whitaker	Frances C. Wilkinson
Rod Whitaker	Stanley J. Wilkinson
Alva V. White, Jr.	Ron Wilkison
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Gene White	Arlene B. Williams
Holly Manke White	Athena Williams
Jeannette Y. White	B. Williams
John H. White	Bill B. Williams
Michael D. White	Carol Lyn Williams
Neal J. White	Dale Williams
Robert W. White	Darlene Williams
Tanja White	Darwin Williams
Trent White	Donna Williams
William White	Eric Williams
Ron Whiteaker	Ernest Leroy Williams
Tim Whitecotton	Fred D. Williams
Irvin R. Whiting	Fred Williams
James R. Whiting	George W. Williams
D. Whitlock	Glynn Williams
Richard L. Whitlow	Howard Williams
John Whitmore	Jeffrey R. Williams
Robin Whitmore	Jim Williams
Jeffrey D. Whitney	Johanna P. Williams
Stanley Whitney	Kathy Williams
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Pamela A. Whyte	Michelle V. Williams
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Walter Wickinson	Missy Williams
Joyce Wicklander	Patricia C. Williams
Darrell Wickline	Richard B. Williams
Dave Wicks	Robert G. Williams
Liz Wicks	Sabrina Williams
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Bill Willner  
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B. Wilson  
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Fred D. Wilson  
Jim R. Wilson  
Joanie Wilson  
Karen Wilson  
Larry Wilson  
M. J. Wilson  
Michael P. Wilson  
Peggy Wilson  
Ralph Wilson  
Shawn Wilson  
Gary Winchell  
Betty Wines  
Elizabeth Wines  
Jim Winfrey  
T. A. Winkelman  
Steve Winn  
Allen C. W. Winsdale, Sr.  
Timothy Winterrteen  
C. W. Winton, Jr.  
Larry Wirta  
Lloyd Wisbey  
Rowdy Wise  
Alfred T. Wisenhunt  
Bonnie Wisenhunt  
Iva Wisenhunt  
Stephen A. Witter  
David Wittermood  
Jon Wittwer  
S. L. Woff  
Mildred B. Wohlers  
G. C. Wold  
Allen Wolf  
David L. Wolf  
Micheal B. Wolf  
Robert E. Wolf  
Richard A. Wolfe  
Sharon Wolfe  
Donna Wolfor  
Jim Wolford  
Tom Wolford  
T. Allan Wolter

Risa Wonsyld  
Brian Wood  
Byron J. Wood  
Dayton D. Wood  
Marian L. Wood  
Norman D. Wood  
Larry L. Woodral  
Larry Woodrow  
Bill Woods  
Patti Woods  
R. C. Woods  
John Woodward  
Steven L. Woodward  
Mary Lou Wooldridge  
Cary Woolsey  
Bob Worthington  
Judith Wortman  
Pat Wortman  
B. Yvonne Wright  
Barbara Wright  
Carol Wright  
Dallas Wright  
Dee Dee Wright  
Duane R. Wright  
Eldon Wright  
Graham J. Wright  
Howard Wright  
James W. Wright  
Kenneth Wright  
Roger Wright  
Roy K. Wright  
M. Wroblewski  
Phillip J. Wyart  
Andy Wyatt  
Edna Wyatt  
Gary Wyatt  
Karla Wyatt  
Maurice Wyatt  
Mel Wyatt  
Melissa Wyatt  
Scott A. Wybark  
John Wydick  
Vernon L. Wynn  
Vernon L. Wynn  
Jon Wynones  
Kimberly Wyscaver  
John Wysong  
Gary Yaeger  
Roger W. Yarberry  
Homer Yates

### *List of Respondents*

Gina Yeates  
Chuck Yeomans  
David A. Yeomans  
Don & Mary Yeomans  
Norma B. Yeomans  
Shirl Yeomans  
Ted & Elane Yeomans  
Craig Yocum  
Denis L. Yocum  
Brenda Yoder  
Eugene M. Yost  
Joseph F. Yost  
Howard Young  
Jack Young  
Larry Young  
Michael A. Young  
Sue Young  
William P. Young  
B. Youngberg  
James Youngblood  
Mark Youngblood  
Juan J. Yruguan  
Martha Zacharias  
E. Zahn  
John Zalman  
Peter M. Zech  
Lee Zeigler

Alex Zeil  
Barbara Zeller  
Barbara Beausoleil Zelwer  
Gary L. Zemn  
Pat Zender  
Aurora Zepeda  
Bev Zerbach  
Bill Zerbach  
Allen Zimmerman  
Delores Zimmerman  
William U. Zimmerman  
Leslie Zimmer  
D. Craig Zollman  
Delovyn Zollman  
Katherine Zollman  
M. F. Zollman  
Rick D. Zollman  
Roger A. Zollman  
Ruby Zollman  
Bruce Zuber  
Marvin Zuber  
Sharon Zuber  
Darrel Zuliger  
Paul J. Zurfluh  
Ronald Zwart  
Susan Zwinger

**Note:** There Were 13 Anonymous Responses, And 55 Illegible Signatures.



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Appendix M  
Biological Opinion

This Appendix is comprised of a verbatim representation of a letter from F. Dale Robertson, Chief of the Forest Service, to the U.S. Fish and Wildlife Service requesting a Biological Opinion on Alternative B, and the Biological Opinion received from the U.S. Fish and Wildlife Service. As well as correspondence from F. Dale Robertson to Dr. William W. Fox, National Marine Fisheries Service, and a response from National Marine Fisheries Service concerning conferencing under the Endangered Species Act.

United States  
Department of  
Agriculture

Forest  
Service

Washington  
Office

14th & Independence SW  
P.O. Box 96090  
Washington, DC 20090-6090

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Reply To: 2670/1950

Date: October 7, 1991

Mr. John F. Turner  
Director, U.S. Fish and Wildlife Service  
1849 C Street, N.W., Room 903  
Washington, D.C. 20240

Dear Mr. Turner:

It is our biological assessment that Alternatives B, C, and D as presented in the enclosed Draft Environmental Impact Statement (DEIS) on Management for the Northern Spotted Owl in the National Forests are not likely to adversely affect the northern spotted owl. Our analysis differs from the assessment contained in your Regional Director's September 20, 1991, letter (Ref. 1-7-91-501) which indicates that these alternatives will "eliminate options for recovery" of the northern spotted owl.

Your September 20 letter conflicts with your own determination in 50 CFR Part 17 (56 FR 40002, August 13, 1991) that "The ISC [alternative B] conservation strategy is based upon the best available information on spotted owls gathered and analyzed over the past 20 years; the ISC Plan represents the best science on the conservation of the northern spotted owl and has been thoroughly peer-reviewed; the areas selected as HCAs were identified by experts familiar with the species and its habitat, based on the principles of biology; and use of the HCAs is consistent with the Service's other conservation efforts (e.g., it has been the focus in section 7 consultation)."

We have determined that the no-action alternative A will not provide for the viability of the northern spotted owl. Alternatives B, C, and D will provide for both short-term and long-term viability of the northern spotted owl and retain options for recovery.

We have assessed the impacts of the alternatives on other proposed or listed species (DEIS, p. 109, Tables 3 & 4-25). We conclude that implementation of any of the alternatives will not adversely affect the American peregrine falcon, gray wolf, grizzly bear, northern bald eagle, brown pelican, Klamath short-nosed sucker, Lost River sucker, Aleutian Canada goose, Oregon silver spot butterfly, or MacDonald's rockcress. Impacts to the proposed marbled murrelet by the implementation of any of the alternatives are unknown due to lack of information on their presence within and needs for this species' habitat. Conferencing on a project specific basis will occur for this species. The DEIS on Management for the Northern Spotted Owl in the National Forests includes background information for this biological assessment.

We are not requesting conferencing on this DEIS for the proposed spotted owl critical habitat. The alternatives in this DEIS are standards for owl protection, not a plan for timber harvest. Conferencing requirements of the Endangered Species Act on a project specific basis will be conducted at the time specific projects are developed. We request concurrence on this approach. At such time there is a final rule on critical habitat, this information will be included in our management strategy.

We request you provide a biological opinion on preferred alternative B by December 27. Enclosed is the Report of the Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl, A Conservation Strategy for the Northern Spotted Owl. This report and the DEIS contain the specific background information requested in the September 20 letter, except for detailed dispersal condition by quarter townships, which is unavailable.

We assume that receipt of your biological opinion for alternative B will also constitute concurrence on the species list that was provided to you on August 22. If you have questions concerning the DEIS and this biological assessment, please contact Kim Mellen (503/326-7462) or Kathy Johnson (202/205-1205).

Thank you for your cooperation and prompt attention to this matter.

Sincerely,

/s/ F. Dale Robertson

F. DALE ROBERTSON  
Chief

Enclosure

cc:

Regional Foresters, R-5 and R-6  
Station Directors, PNW and PSW  
Jerry Hutchins, R-6  
Marvin Plenert, USFWS





# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

911 N.E. 11th Avenue  
Portland, Oregon 97232-4181

In Reply Refer To:  
1-7-91-I-501

December 18, 1991

Mr. Jerry Hutchins  
U.S. Forest Service  
Pacific Northwest Region  
319 S.W. Pine Street  
Portland, Oregon 97208-3623

Dear Mr. Hutchins:

Pursuant to 50 CFR 402, the U.S. Fish and Wildlife Service (Service) is submitting a biological opinion on the preferred alternative described in the Forest Service's Draft Environmental Impact Statement on Management for the Northern Spotted Owl in The National Forests (Draft EIS). The Forest Service concluded, and the Service concurs, that the adoption of the preferred alternative is not likely to adversely affect the American peregrine falcon (*Falco peregrinus anatum*), gray wolf (*Canis lupus*), grizzly bear (*Ursus arctos*), bald eagle (*Haliaeetus leucocephalus*), brown pelican (*Pelecanus occidentalis*), Klamath short-nosed sucker (*Chamistes brevirostris*), Lost River sucker (*Deltistes luxatus*), Aleutian Canada goose (*Branta canadensis leucopareia*), Oregon silverspot butterfly (*Sepyeria zerene hippolyta*), or MacDonald's rockcress (*Arabis macdonaldiana*). The Forest Service stated in an October 3, 1991 letter that conferencing on the marbled murrelet would be conducted on a project specific basis; therefore, it is not addressed in this document. According to the Draft EIS, the federally threatened northern spotted owl (*Strix occidentalis caurina*) is the only listed species affected by the proposed actions.

At a meeting on July 18, 1991, the agencies agreed to a two part consultation. The first part, informal consultation, was completed by the Service on September 20, 1991. The second part is this formal consultation on your preferred alternative, to be completed during the public comment period for the Draft EIS. On October 3, 1991, the Service received a written request for formal consultation on your preferred alternative that also expressed the Forest Service's desire to receive a final biological opinion by December 27, 1991.

At a meeting in Portland, Oregon, on November 25, 1991, the Service explained the preliminary findings of the consultation to Forest Service representatives from Region 6 and the EIS Team. At that meeting, the Forest Service requested the opportunity to review a draft biological opinion. The agencies met on December 17, 1991, to discuss the draft biological opinion.

A list of the major information sources used to complete this analysis is included in the Literature Cited section of this document. In addition to these major sources, data contained in our files were considered in the preparation of these biological opinions.

## I. BIOLOGICAL OPINION

It is the biological opinion of the Service that adoption of the preferred alternative B, the Interagency Scientific Committee's A Conservation Strategy for the Northern Spotted Owl (Conservation Strategy) (Thomas et al. 1990a), is not likely to jeopardize the continued existence of the northern spotted owl.

## II. DESCRIPTION OF THE ACTION

The subject of this formal consultation is the adoption of the preferred alternative contained in the Draft EIS. The consultation does not specifically address on-the-ground implementation of the alternative.

The preferred alternative is the adoption of the Conservation Strategy. This strategy includes:

- o maintenance of population clusters, called Category 1 and 2 Habitat Conservation Areas (HCAs), distributed in a manner that will allow for movements of dispersing northern spotted owls between HCAs;
- o maintenance of additional northern spotted owl sites as Category 3 HCAs in areas where northern spotted owl populations are considered very low;
- o maintenance of forest conditions outside the HCAs according to the 50-11-40 rule, designed to provide adequate conditions for the movement of dispersing northern spotted owls between HCAs; and
- o direction for the establishment of a monitoring plan to provide the basis for long-term adaptive management.

Additional information on the preferred alternative is contained in the Draft EIS (USDA 1991) and the Conservation Strategy. Based on information provided by Forest Service biologist Kim Mellen, adoption of the Conservation Strategy is not limited to the Standards and Guidelines contained in Appendix Q, but includes all aspects of the Conservation Strategy with the exception that the interagency oversight body recommended in the Conservation Strategy will be replaced with a Forest Service oversight team.

## III. SPECIES ACCOUNT

Detailed accounts of the taxonomy and biology of the northern spotted owl are found in the 1987 and 1990 Fish and Wildlife Service Status Reviews (USDI 1987, 1990a), the 1989 Status Review Supplement (USDI 1989), the Conservation

Strategy, and the final rule designating the northern spotted owl a threatened species (USDI 1990b).

#### IV. ENVIRONMENTAL BASELINE

At the present time, the exact amount of existing habitat suitable for use by northern spotted owls is unknown. In 1990, the Conservation Strategy estimated the total amount of suitable habitat at 6.8 million acres, but this did not include many thousands of acres since documented on private lands in California. The Conservation Strategy estimated that 5.06 million acres of habitat existed on the National Forests. Based on more recent inventories, the Draft EIS (Table 3&4-3, p. 3&4-14) estimated the total amount of habitat on the National Forests at about 5.67 million acres, and the total amount in the range at 7.6 million acres.

Northern spotted owls are not evenly distributed across their range. In general, densities are greater in suitable habitat at lower elevations and lower latitudes. Data from the Draft EIS indicate that the density of northern spotted owl pairs per suitable acre is approximately twice as high in Oregon and California as in Washington. The Draft EIS estimates the known population on the National Forests in Washington at 423 pairs, in Oregon at 1,249 pairs, and in California at 528 pairs.

General descriptions of habitat condition in the various provinces may be found in the Conservation Strategy and in the Service's informal consultation document on the Draft EIS alternatives (USDI 1991). As summarized in the 1990 Status Review (USDI 1990a), and as stated in the Draft EIS, timber harvest in recent decades has resulted in severe declines in northern spotted owl habitat; this loss of habitat was the primary reason the species was listed. The loss of habitat to timber harvest has been exacerbated by windthrow, wildfire, and insect damage, and may have resulted in increased competition among northern spotted owls and other raptor species. Habitat is in particularly poor condition in several Areas of Concern identified by the Conservation Strategy, including the Olympic Peninsula in Washington, the Oregon Coast Ranges, and the Shasta/McCloud area in California.

Another important factor in the listing of the northern spotted owl was the lack of effective regulatory mechanisms to protect the species. Since the listing of the northern spotted owl as a threatened species, several regulatory mechanisms have been applied. Most basic are those contained in section 9 of the Act, which prohibits take of listed species by any Federal or State agency or private party; section 7 of the Act, which requires Federal agencies to consult with the Service on any action that may affect listed species and establishes authorization of take that will not jeopardize the continued existence of the species; and section 10 of the Act, which requires conservation plans before take is authorized for State agencies and private parties.

The internal policies of Federal agencies also provide an important regulatory framework protecting the species. Under the preferred alternative, the Conservation Strategy will become the basis for Forest Service management of

the species in all three states. The Bureau of Land Management is currently operating under timber management plans and an instructional memorandum as a policy base for northern spotted owl management while they complete new land management plans.

In 1991, the Secretary of the Interior formed the northern spotted owl Recovery Team, which is currently preparing a Recovery Plan for the species. This plan is expected to provide a comprehensive direction for future management of the species on Federal and non-federal lands.

## V. EFFECTS OF THE ACTION

Effects of the proposed action include the direct and indirect effects of adopting the Conservation Strategy. Direct effects occur simultaneously with, or immediately after, implementation of the proposed action. Indirect effects include future activities that are induced by this action and that occur after the action is completed. Effects of the action also include effects that are interrelated and interdependent with the action. Future actions with Federal involvement, not included in this action as submitted, and which potentially impact northern spotted owls and their habitat, are not covered under this document but are subject to separate section 7 analysis and review.

This section discusses the effects of adoption of the Conservation Strategy, together with the effects of other activities that are interrelated and interdependent with the actions, as well as the cumulative effects of future State or private activities reasonably certain to occur in the action area. All of these actions are evaluated against, and subsequently added to, the current environmental baseline.

Actions involving the removal or degradation of owl habitat are likely to adversely affect northern spotted owls. Although the preferred alternative will maintain short- and long-term viability of the subspecies, short-term adverse effects are likely to result from the harvest of many thousands of acres of suitable owl habitat and the taking of northern spotted owls.

### NORTHERN SPOTTED OWL HABITAT

In the short term, implementation of the Conservation Strategy will result in stabilization of habitat quality and quantity in the HCAs. In the long term, habitat condition in HCAs will improve as existing young timber stands grow to become suitable for use by northern spotted owls. Outside the HCAs, quality and quantity of suitable habitat will decline due to continued timber harvest. However, dispersal habitat will be adequately managed on the National Forests outside the HCAs to provide connectivity between HCAs. The net result within and outside HCAs will be continued decline in total amount of suitable habitat in the short term, with an expected increase in HCAs within about 100 years as stands mature.



## NORTHERN SPOTTED OWL POPULATION AND DISTRIBUTION

The preferred alternative provides for the maintenance of approximately 1,300 pairs of northern spotted owls currently known to exist within the boundaries of the HCAs. Approximately 900 known northern spotted owl pairs lie outside the HCAs. As timber harvest continues outside the HCAs, many of these pairs may be lost. Therefore, the total population of northern spotted owls on the National Forests is expected to decrease in the short term. Populations will eventually stabilize as habitat within the HCAs recovers to suitable condition and the HCAs become fully stocked with northern spotted owls.

In Areas of Concern, where local populations are considered dangerously low, additional protection is provided for northern spotted owl sites outside the large Category 1 and 2 HCAs. On the National Forests, these areas include the North Cascades, Olympic Peninsula, Oregon Coast Ranges, Southern Deschutes, and Shasta/McCloud. Protection of individual pairs in these areas will help maintain short-term viability while habitat recovers within the large HCAs.

The preferred alternative provides for the distribution of northern spotted owls throughout the range of the subspecies on the National Forests through the placement of Category 1 and 2 HCAs. Spacing of the large HCAs, and maintenance of adequate dispersal habitat between HCAs, will allow for interactions between HCAs and maintain northern spotted owls throughout the National Forests.

## CONNECTIVITY

Implementation of the Conservation Strategy will help prevent isolation of population clusters through adequate spacing of HCAs and maintenance of adequate dispersal conditions between HCAs on the National Forests. However, connectivity problems, both within and between provinces, may continue to exist in areas outside Forest boundaries and in areas of "checkerboard" ownership.

## CATASTROPHIC EVENTS

In some areas, catastrophic events, such as volcanic eruptions, storm events, insect infestations, disease outbreaks, and large-scale wildfires, can result in the substantial loss of northern spotted owls and habitat. Some of these losses were anticipated, and their impacts minimized or lessened, through the incorporation of certain features in the Conservation Strategy. The Conservation Strategy addresses potential catastrophic events by (1) providing HCAs large enough to support a habitat "cushion" for small catastrophic events, (2) ensuring the widespread geographic distribution of HCAs, and (3) establishing an aggregation of population clusters throughout the subspecies' range. The Conservation Strategy also calls for the development of HCA management plans to provide for insect, disease, and fire management within HCAs. Such plans would hopefully address the risk of a catastrophic event and options for reducing these.

## COMPETITION

Although the effect of interspecific competition with barred owls has not been fully documented, sufficient information exists to justify some concern over potential long-term negative effects. Barred owls seem to respond favorably to environmental conditions, such as fragmentation, that appear detrimental to northern spotted owls. There is also evidence of northern spotted owl/barred owl hybridization. These concerns are greatest in the northern portion of the northern spotted owl's range in Washington. The Conservation Strategy anticipates that HCAs will become less desirable to species such as the barred owl as fragmentation decreases over time. The potential threat of barred owl competition and hybridization should be monitored.

## INTERRELATED AND INTERDEPENDENT EFFECTS

Regulations defining interrelated and interdependent effects are found at 50 CFR 402.02. Adoption of the preferred alternative is the subject of this consultation; its implementation and the resulting harvest of owl habitat and take of owls, are interrelated. The Draft EIS does not contain enough information to quantify these effects -- for example, information provided on timber harvest quantities and amount of incidental take are not specific to location.

The Service also considers certain actions of other agencies to be interrelated with the Forest Service adoption of the Conservation Strategy because the Conservation Strategy is based on participation of all Federal land managing agencies. As a case in point, the Forest Service has stated their basic assumption that the Bureau of Land Management will comply with the Act in their management of the northern spotted owl. The Service's analysis of the preferred alternative is based on this assumption. However, if the Bureau of Land Management's current application for exemption from section 7(a)(2) of the Act is granted, the Service would consider that eventuality as significant new information (50 CFR 402.16). Under that circumstance, the Service and the Forest Service must consider the need for reinitiation of this consultation.

## SUMMARY OF EFFECTS

Based on the risk assessment of the Conservation Strategy and the viability assessment in the Draft EIS, the potential short term reduction in northern spotted owl habitat and populations is consistent with maintaining viable northern spotted owl populations. Both analyses suggest that the preferred alternative would maintain viable northern spotted owl populations on the National Forests in the short and long term. The preferred alternative sufficiently addresses our concerns about, and potential Forest Service contributions toward, management of spotted owls as contained in the Informal Consultation on the Draft EIS (USDI 1991). However, the Service remains concerned about the distribution of population clusters and provisions for dispersal outside National Forest boundaries.

## VI. CUMULATIVE EFFECTS

Cumulative effects are those impacts of future state and private actions that are reasonably certain to occur within the area of the action subject to consultation. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed action.

The Draft EIS presented an overview of management on non-federal lands, but neither the Draft EIS nor the biological assessment specifically presented a cumulative effects analysis. Nonetheless, certain assumptions can be made regarding the probable fate of northern spotted owl habitat on non-federal lands within the Forest Service's "action area." Suitable habitat continues to be harvested on non-federal lands throughout the range of the northern spotted owl; however, to varying degrees, compliance with the Act's section 9 take prohibition can be expected to result in the maintenance of minimal habitat around known northern spotted owls.

The likelihood of this protection is dependent on (1) the level of survey conducted prior to harvest, (2) the density of northern spotted owls in an area, (3) the extent that timber harvest proposals are reviewed and permitted by the states' forest resource agencies, and (4) the level of landowner participation in the section 10 habitat conservation planning process. Northern spotted owls are assured the highest level of protection from take in California, where all logging on private land is currently reviewed to ensure that no take will occur without a section 10 permit. Washington and Oregon follow, in descending order of protection.

Compliance with the take prohibition of the Act does not assure the maintenance of dispersal habitat within Areas of Concern and checkerboard ownership nor provide for improvement of existing populations. Consequently, it is likely that a reduction in dispersal habitat will occur in certain areas. The ramifications are greatest within areas of checkerboard ownership, such as the I-90 corridor, where a large portion of the area on the National Forests are currently below adequate dispersal condition.

It is expected that the Recovery Plan will identify goals for non-federal lands within each province. These goals will most likely form the basis for section 10 planning on non-federal lands.

## VII. INCIDENTAL TAKE STATEMENT

This consultation does not specifically address on-the-ground implementation of the preferred alternative. Therefore, the level of incidental take cannot be anticipated and no incidental take is authorized at this time. Incidental take will need to be evaluated on a project level basis when site specific information is available.

### VIII. CONSERVATION RECOMMENDATIONS

The term "conservation recommendations" has been defined as suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed actions on listed species or critical habitat or regarding the development of information (see 50 CFR 402.14(j)). The Service recommends that the following conservation measures be considered in the adoption of a plan for the management of the northern spotted owl:

1. Implement the monitoring plan described in the Conservation Strategy as soon as possible to determine if minor modifications to the management plan are needed in future reviews.
2. Develop and implement HCA management plans as described in the Conservation Strategy as soon as possible, particularly in areas where the potential for catastrophic habitat loss is highest.
3. In areas where dispersal habitat condition is already below that recommended in the Conservation Strategy, use silvicultural practices to accelerate young stands into 11-40 condition and maintain existing stands at a minimum of 11-40 condition.
4. In areas with checkerboard ownership, explore options for providing improved dispersal conditions on the National Forests. Review the adequacy of the dispersal condition within these areas as soon as practical.
5. In areas requiring the development of Category 3 HCAs, if sufficient pairs are not located to meet the established targets, provide more certainty for short-term populations by protecting resident single northern spotted owls in a similar manner. Protection of the resident singles may be dropped as more pairs are located, so that the total number of protected pairs meets the predetermined targets.
6. Plan actions to preserve options for implementation of the recovery plan for the northern spotted owl and adopt the final recovery plan as early as possible.

### IX. CLOSING

This concludes formal consultation on the Forest Service's preferred alternative for management of the northern spotted owl in Washington, Oregon, and northern California. The Service commends the Forest Service for its efforts to adopt a long-term management strategy for the conservation of the threatened northern spotted owl.

Because the level of incidental take can not be anticipated and no incidental take was authorized, project specific consultation will be necessary. Reinitiation of formal consultation is required if new information reveals effects of these actions that may affect listed species in a manner or to an extent not considered in this biological opinion, if the action is



subsequently modified in a manner that causes an effect to the listed species that was not considered in these biological opinions, or if a new species is listed or critical habitat designated that may be affected by the action.

If questions arise concerning the contents of this biological opinion contact Dale Hall, Assistant Regional Director for Fish and Wildlife Enhancement, at (503) 231-6150 or FTS 429-6150.

Sincerely,

A handwritten signature in dark ink, appearing to read "Don Watters". The signature is fluid and cursive, with the first name "Don" being more prominent than the last name "Watters".

Acting Regional Director

## X. LITERATURE CITED

- Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990a. A conservation strategy for the northern spotted owl. A Report by the Interagency Scientific Committee to address the conservation of the northern spotted owl. U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Fish and Wildlife Service, Bureau of Land Management, and National Park Service. Portland, Oregon. 427 pp.
- Thomas, J.W., E. D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990b. Answers to questions submitted to the Interagency Scientists Committee by the United States Senate Committee on Energy and Natural Resources, Senator Dale Bumpers, Chairman. For the record of the hearing held May 23, 1990. Submitted by Jack Ward Thomas, Chairman, Interagency Scientists.
- U.S. Department of Agriculture. 1991. Draft Environmental Impact Statement on Management for The Northern Spotted Owl in The National Forests. Forest Service, Pacific Northwest Region. Portland, Oregon.
- U.S. Department of the Interior. 1987. The northern spotted owl status review. Fish and Wildlife Service. Portland, Oregon. 47 pp.
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- U.S. Department of the Interior. 1990b. 1990 Status Review: northern spotted owl; *Strix occidentalis caurina*. Report to the Fish and Wildlife Service. Portland, Oregon. 95 pp.
- U.S. Department of the Interior. 1990b. Endangered and threatened wildlife and plants; determination of threatened status for the northern spotted owl; final rule. 50 CFR Part 17, Federal Register, June 26, 1990. Pages 26114-26194.
- U.S. Department of the Interior. 1991. Informal consultation on the U.S. Forest Service Environmental Statement for Management of the Northern Spotted Owl. U.S. Fish and Wildlife Service, Portland, Oregon.

## XI. GLOSSARY

**RESIDENT NORTHERN SPOTTED OWL:** Resident spotted owls may be single or members of pairs that meet the requirements for residency under the Survey Guidelines endorsed by the Service.

**SUITABLE HABITAT:** As defined in the draft alternatives, suitable habitat includes nesting, roosting, and/or foraging habitat.

**DISPERSAL HABITAT:** Forest stands that will provide, as a minimum, for movement and short-term roosting/foraging for northern spotted owls. For example, Thomas et al. (1990a) defined forests with trees an average of 11 inches diameter breast height (dbh) and 40 percent crown cover, capable of supporting these functions. Other definitions are possible.

**DISPERSAL CONDITION:** The amount and distribution of dispersal habitat that will provide for successful dispersal between specified areas. The Conservation Strategy defined acceptable dispersal condition as 50 percent of the forested landscape in each quarter-township in dispersal habitat. Any definition should include both amount and distribution of habitat.

**POPULATION CLUSTERS:** Clusters are groups of resident northern spotted owls that may act as independent breeding units. These should occur on large blocks of reserved lands, such as the HCAs as described in the Conservation Strategy. Population clusters should have the following characteristics:

- o Areas with habitat for population clusters should be large enough, and contain enough resident northern spotted owls, to provide for internal maintenance of a viable population for 4-5 generations. If existing populations are below this level, increasing populations as quickly as possible will reduce the potential for extinction within a cluster.
- o Each population cluster should be capable of maintaining long-term viability with minimal input from neighboring clusters, although some movement is expected to occur.
- o To reduce fragmentation and increase overall capacity, forest within the population clusters should be allowed and encouraged to reach suitable condition. Some silvicultural treatments of existing unsuitable stands may increase suitability or replace missing habitat components more quickly.
- o Each cluster should be large enough to maintain viable populations, short- and long-term, with moderate losses to potential catastrophic events.
- o Clusters should be placed throughout the National Forests to provide for dispersion of northern spotted owls throughout as much of a province as possible. Coordination with neighboring

landowners, especially Federal, in developing range-wide systems will aid the process.

- o To provide connectivity between clusters, clusters should be placed to allow a reasonable probability of movement between clusters and provide for dispersal/movements through the forest matrix outside centers.



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Forest  
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P.O. Box 96090  
Washington, DC 20090-6090

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Reply To: 2670/1950

Date: October 9, 1991

Dr. William W. Fox  
National Marine Fisheries Service  
1335 East-West Highway  
Silver Spring, MD 20910

Dear Dr. Fox:

The Forest Service has developed a Draft Environmental Impact Statement on Management for the Northern Spotted Owl in the National Forests (DEIS). A copy of the DEIS is enclosed for your review. We request your concurrence that implementation of the alternatives is not likely to jeopardize the continued existence of Snake River Sockeye and Chinook Salmon.

Since rules were published in 1991 in the Federal Register proposing the listing of the Snake River Sockeye and Chinook Salmon under the Endangered Species Act, we have evaluated the implications of the DEIS alternatives regarding these proposed species. The alternatives in this DEIS are standards for owl protection, not a plan for timber harvest. The effects of spotted owl management on watershed and fisheries values are indirect. The alternatives vary by designated areas managed primarily for spotted owl habitat and therefore, by the degree to which land disturbing activities may take place. The most common form of such activity on National Forests within the range of the northern spotted owl is logging and associated road-building.

While water quality, riparian areas, and aquatic habitats are assumed to be protected by implementation of Best Management Practices, standards and guidelines, and mitigation measures; there is still an element of risk associated with logging and road-building.

Episodic events such as large floods, rain-on-snow events, and other factors may result in poor water quality and damaged aquatic habitat. With less disturbance, risk would be reduced. Consequently, there would be less risk as the total designated area managed primarily for spotted owl habitat increases across alternatives.

Alternatives A, B, and C, in respective order, would afford greater degrees of protection from risk. Alternative D, the alternative with the most designated area managed primarily for spotted owl habitat would afford the greatest protection for watershed and fisheries resources. Of the alternatives, this would have the least risk of erosion, reduced water quality, and potential degradation of aquatic habitat.

Alternatives B, C, and D include some existing logged areas within designated areas managed primarily for spotted owl habitat. In these areas, watershed conditions would gradually return to those found in undisturbed forests. Aquatic habitat would become gradually more complex, as large wood falls into stream channels. Stream channels may stabilize depending upon existing conditions. Where populations of anadromous salmonids are found, the potential for smolt production would increase as habitat conditions improve. Sediment input would decrease and water quality would improve within and downstream from the National Forests.

It is the Forest Service's assessment that implementing any of the DEIS alternatives, including preferred alternative B (Interagency Scientific Committee Conservation Strategy), is not likely to jeopardize the continuing existence of the proposed Snake River Salmon. This letter documents our ' conferencing with you on these proposed salmonids. Please provide your concurrence with our assessment, or other comments, by November 27. Thank you for your prompt attention to this conference.

Sincerely,

/s/ F. Dale Robertson

F. DALE ROBERTSON  
Chief

Enclosure

cc: Mr. Merritt Tuttle, NMFS  
Regional Foresters, R-5 and R-6  
Station Directors, PNW and PSW  
Jerry Hutchins, EIS Team

United States  
Department of  
Agriculture

Forest  
Service

Washington  
Office

14th & Independence SW  
P.O. Box 96090  
Washington, DC 20090-6090

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Reply To: 2670/1950

Date: December 16, 1991

Dr. William W. Fox  
National Marine Fisheries Service  
1335 East-West Highway  
Silver Spring, Maryland 20910

Dear Dr. Fox:

In a letter dated October 9, 1991, the Forest Service initiated an informal conference regarding the effects of implementing the alternatives of a Draft Environmental Impact Statement (DEIS) on Management for the Northern Spotted Owl in the national forests on wild and naturally reproducing sockeye and chinook salmon of the Snake River Basin. In that letter we requested your concurrence that none of the alternatives were likely to jeopardize these species which were proposed for listing under the Endangered Species Act. Since then sockeye salmon have been formally listed as endangered and there are indications that a decision regarding chinook will be made prior to the release of the Final EIS.

Based on the assessment included in the DEIS and information in our earlier letter, the Forest Service has determined that none of the DEIS alternatives proposed for management of northern spotted owls are likely to adversely affect wild and naturally reproducing Snake River Basin sockeye or chinook salmon.

We are seeking concurrence with our findings and ask that you provide a letter of concurrence or other comments by December 27.

Sincerely,

/s/ James C. Overbay

F. DALE ROBERTSON  
Chief

Enclosure



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
Northwest Region  
7600 Sand Point Way N.E.  
Seattle, WA 98115

January 7, 1992

Mr. Dale Robertson  
U.S. Forest Service  
P.O. Box 96090  
Washington, D.C. 20090-6090

Dear Mr. Robertson,

This letter constitutes our response to the Forest Service's request for conferencing under the Endangered Species Act (ESA) on the effects of the proposed actions analyzed in the "Draft Environmental Impact Statement (DEIS) on Management for the Northern Spotted Owl in the National Forests" (September 1991). It also constitutes our response to the DEIS as a commenting agency, as required by the National Environmental Policy Act (NEPA). Since the Snake River sockeye salmon was listed as endangered under the ESA on December 20, 1991, this letter also represents our response to informal consultation on this species.

The regulations implementing section 7 of the ESA require that, if proposed species are subsequently listed or the proposed critical habitat is designated prior to completion of the actions described in the DEIS, the U.S. Forest Service should review those actions to determine whether formal consultation is required (50 CFR 402.10(c)). However, should Snake River fall chinook salmon and Snake River spring/summer chinook salmon become listed, consultation on these species will not be required, based on the comments below.

Implementation of any alternative set forth in the DEIS is unlikely to adversely affect the continued existence of Snake River sockeye salmon, Snake River spring/summer chinook salmon, or Snake River fall chinook salmon. Reasons include:

- 1) Portions of Gifford Pinchot and Mt. Hood National Forests adjacent to the mainstem Columbia River are the only areas included in the DEIS that border habitat utilized by Snake River sockeye and chinook salmon.





- 2) This section of the Columbia River is important for migration of juvenile and adult sockeye and chinook salmon and may be important for rearing during downstream migration. Forest practices described in the DEIS should have minimal impact on mainstem Columbia River fish passage and rearing habitat.
- 3) Most of the acreage in the areas adjacent to the mainstem Columbia River will be managed as spotted owl Habitat Conservation Areas (HCAs) with restricted timber harvests under Alternatives B-D. Less acreage will be included in Spotted Owl Habitat Areas (SOHAs) under the "No Action" alternative, A.
- 4) Indirect effects are also unlikely. Under Alternatives B-D, the incorporation of the "50-11-40" rule into management of Forest Service lands not included in the HCAs will help reduce the possibility of increased timber harvest in these areas to make up for lost timber production within HCAs. (Alternative A, however, does not include similar conditions). [The "50-11-40" rule states that in each quarter township (9 square miles) 50% of the forest must be maintained in (or managed to achieve) stands where the trunk diameter at breast height is 11 inches or more and the forest canopy is closed over 40% of the area].

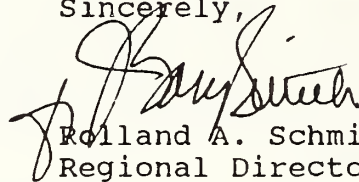
The preceding comments address only the adequacy of the DEIS regarding Snake River salmon species currently listed or proposed for listing under the ESA. We are also concerned about the status of other depleted stocks within the area affected by the DEIS. The American Fisheries Society has listed 214 depleted salmonid stocks in the Pacific Northwest (including, in part, the species already listed or proposed under the ESA), some of which have spawning and juvenile rearing habitat in areas affected by the DEIS, Fisheries 16:4 (1991). As pointed out by the Scientific Panel on Late-Successional Ecosystems (Gordon, J., J. Franklin, K. Johnson, and J. Thomas. 1991. Alternatives for management of late successional forests of the Pacific northwest: a report to the U.S. House of Representatives, Committee on Agriculture and Committee on Merchant Marine and Fisheries. Washington, D.C. Draft. 30 p. Described in DEIS, page 3&4-119), both alternatives A and B (C and D were not evaluated) would provide very low to low probability of maintaining viable populations of sensitive fish stocks.

Alternative D, which includes the largest acreage of riparian area with old-growth forest characteristics, offers the greatest protection to these depleted salmonid stocks (see p. 3&4-118 of the DEIS). Decreasing protection is offered by Alternatives C,

B, and A, respectively. Therefore, we recommend Alternative D as the best alternative for protecting depleted stocks that are not currently proposed or listed under the ESA.

Thank you very much for the opportunity to conference and consult under the ESA and to provide comments on this DEIS.

Sincerely,



Roland A. Schmitten  
Regional Director

cc: Kim Mellen - USFS, Portland  
Dave Cottingham - NOAA  
Pat Montanio - F/PR2

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